DEPARTMENT OF THE NAVY
NAVAL AIR STATION OCEANA
1750 TOMCAT BOULEVARD
VIRGINIA BEACH, VIRGINIA 23460-2191

IN REPLY REFER TO:
NASOCEANAINST 3750.2A
22
24 AUG 2000

NAVAL AIR STATION OCEANA INSTRUCTION 3750.2A

Subj: NAS OCEANA BIRD ANIMAL STRIKE HAZARD (BASH) PROGRAM

Ref: (a) OPNAVINST 3750.6Q
(b) NAVFAC P-73 VOL II
(c) OPNAVINST 5090.1B, CH. 2
(d) USDA Prevention and Control of Wildlife Damage, 1994

Encl: (1) Naval Air Station Oceana BASH Plan
(2) Chambers Field BASH Plan
(3) Self-Inspection Checklist

1. Purpose. To establish an integrated bird and animal control and hazard abatement program in accordance with references (a) through (c). The program is designed to minimize aircraft exposure to potentially hazardous bird and animal strikes on and around Naval Air Station (NAS) Oceana, Naval Auxiliary Landing Field (NALF) Fentress and NAS Oceana Air Detachment Norfolk (Chambers Field).

2. Cancellation. NASOCEANAINST 3750.2. This instruction is a complete revision and should be read in its entirety.

3. Discussion. Birds and animals around airfields pose an ever-present and variable hazard to safe flight operations. Total elimination of the problem is impossible; however, airfields can implement programs and procedures to reduce specific hazards. This instruction and enclosures (1) through (3) are designed to reduce Bird Animal Strike Hazard (BASH) at NAS Oceana and Chambers Field through avoidance procedures, monitoring bird and animal activity and controlling bird and animal populations through lethal and nonlethal methods identified in reference (d).

4. Definition of terms. The following terms and definitions apply to this instruction:

a. Active Bird Dispersal. Harassment techniques employed to disperse birds from airfield and surrounding areas. Methods include chase, pyrotechnics, bioacoustics and lethal control.

b. BASH. General term to describe bird hazards and bird hazard programs.

c. Bird Hazard Working Group (BHWG). Local committee of installation personnel concerned with bird hazards. Executes and makes recommendations to the BASH program.

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c. Bird Hazard Working Group (BHWG). Local committee of installation personnel concerned with bird hazards. Executes and makes recommendations to the BASH program.

d. Bird Hazard Condition (BHC). A bird hazard alert condition used to warn aircrew of bird activity.

e. Bird Detection and Dispersal Team (BDDT). The designated Airfield Facilities Support Crew which reports BHC's and assists natural resources personnel in bird dispersal.

f. Bird Strike. Any contact between a bird or other animal and an aircraft, whether or not damage occurred.

5. Action

a. The Air Operations Officer shall determine and direct bird dispersal and abatement procedures and shall appoint a representative to serve on the BHWG. The Air Operations Officer shall conduct these duties with the following assistance:

(1) Aviation Safety Officer shall:

(a) Chair the BHWG.

(b) Act as the liaison between the BHWG co-chair and all aviation activities at NAS Oceana and Chambers Field to develop and maintain an awareness of this instruction and enclosures (1) and (2). The Aviation Safety Officer shall utilize monthly safety meetings to disseminate BASH information to Squadron representatives and ensure bird strikes are reported by all squadrons as specified by reference (a).

(c) Conduct periodic reviews of the BASH program using enclosure (3).

(d) Publish operating instructions/checklists and conduct training as appropriate to support this plan.

(2) The Natural Resources Manager, Regional Engineer Environmental Group shall:

(a) Serve as a Co-chair of the BHWG.

(b) Maintain and provide a review file of all BASH reports occurring at NAS Oceana and Chambers Field. This database will facilitate the continuing development of enclosures (1) and (2) and notification to Air Operations Officer of potential hazards.

(c) Through station Natural Resources personnel and the Aviation Safety Officer, disseminate information contained in this instruction and enclosures (1) and (2).

(d) Assist the Air Operations Officer in determining aircraft and airfield procedures to reduce BASH hazard.

(e) Coordinate station Natural Resources personnel monthly inspections of airfield conditions and recommend airfield and land management practices to reduce wildlife attractants in and around the runway complex. Assist in the subsequent modification of airfield habitat to reduce BASH hazard.

(f) Monitor bird/animal activity through regular surveys and coordinate with local groups and agencies such as the Institute for Bird Populations, Audubon Society and U.S. Fish and Wildlife Service to obtain additional information on local, migratory and seasonal bird activity. Maintain this information in the BASH database and provide activity analysis to the Aviation Safety Officer.

(g) Through station Natural Resources personnel review agricultural practices, leases and coordinate with the lessee to reduce BASH hazards.

(h) Maintain required wildlife depredation permits and records of dispersal and depredation activities.

(i) Develop and maintain depredation and dispersal procedures. Supervise depredation and disposal activities when lethal methods are required; provide the appropriate personnel, training and maintain weapons certification.

(j) Through station Natural Resources personnel, identify remains of birds/animals involved in BASH incidents and incorporate this information into management database.

(k) Implement future consolidation of enclosures (1) and (2) into one comprehensive BASH Plan for the Commander, Navy Region, Mid-Atlantic Air Operations Program Manager.

(3) Air Traffic Control Division Officer shall:

(a) Serve as a member of the BHWG.

(b) Issue BASH warning, via Automatic Terminal Information System (ATIS) and Ground/Tower radio frequencies, whenever Bird Hazard Conditions (BHC) are observed. Use BHC conditions outlined in enclosures (1) and (2) to report significant bird activity around NAS Oceana and Chambers Field.

(c) Pass BHC information to the Air Operations Duty Officer.

(d) Advise the Air Operations Duty Officer anytime BHC HEAVY (Severe) condition is declared as specified in enclosures (1) and (2).

(e) Allow BDDT priority movement on the airfield to disperse birds on or near active runway.

(f) Alert BDDT of bird hazards when potentially hazardous bird/animal activities are observed.

(g) Maintain, through the Air Operations Duty Officer, a log of all significant wildlife activity in and around the airfield which may pose a threat to aircraft operations. This log should be available for monthly review by the Natural Resources Manager and BDDT.

(4) Airfield Facilities Division Officer shall:

(a) Provide Airfield Facilities Support Crew personnel to assist natural resources personnel in bird dispersal activities as members of the BDDT.

(b) Coordinate flightline site location and security for storage and maintenance of necessary pyrotechnics and other bird dispersal equipment.

(c) Investigate all bird/animal strikes and collect bird remains involved in the collision to allow the Natural Resources Manager to make a species identification.

(d) Serve as member or designate representative for the BHWG.

(e) Monitor grass height and condition of drainage features, requirements for filling or street sweeping low areas that collect water following rain events and report requirements as necessary to the Regional Engineer Storefront.

(f) Conduct periodic exercises and inspections of the BASH Program in conjunction with Aviation Safety Officer and Natural Resources Manager.

(5) Aviation Squadrons shall:

(a) Have a representative attend monthly aviation safety meetings and disseminate BASH information to aircrews. Emphasis should be placed on the importance of reporting all significant bird and animal activity that may pose a strike hazard.

(b) Contact the station Natural Resources personnel for pick up of bird remains and BASH report following bird strikes. Accurate species identification is useful for monitoring bird activity.

(c) Submit a copy of all BASH reports to the Aviation Safety Officer and Natural Resources Manager for all strikes, including those where bird remains cannot be collected.

(d) Ensure any applicable bird activity data is readily available to aircrews during mission planning.

(e) Issue specific guidance for units on:

1. Procedures and restrictions to be followed under hazardous BHC's.

2. Bird strike reporting, damaging and non-damaging.

3. Bird remains collection and preservation.

(6) The Bird Hazard Working Group shall hold a quarterly working meeting as a special session to the monthly aviation safety council meeting to assess the status of the BASH reduction program. Team membership shall consist of:

(a) Aviation Safety Officer (Chair)

(b) Natural Resources Manager (Co-chair)

(c) Airfield Facilities Division Officer (or designee)

(d) Air Operations Officer (or designee)

(e) Air Traffic Control Division Officer

(f) Weapons Department (as required)

(g) Security Department (as required)

(h) Air Installation Compatible Use Zones Officer (or designee)

(7) Bird Detection and Dispersal Team (BDDT) shall:

(a) Carry out bird detection and dispersal activities.

(b) Have immediate access to bioacoustic and pyrotechnic equipment for bird dispersal.

(c) Assist in BHC reporting to Air Traffic Control.

(d) Report any changes in bird activity and file records of bird dispersal/control with the Natural Resources Manager.

(e) Have authority to request temporary runway closure for unannounced and scheduled BASH operations.

(8) Regional Engineer Pest Control Commodity shall:

(a) Assist in the control of birds that present a health hazard in occupied buildings and hangars.

(b) Maintain certification necessary to apply repellents and/or toxicants for bird control.

(c) Obtain approval from U.S. Department of Agriculture Wildlife Services for restricted bird toxicant application.

(9) Security Division Officer shall:

(a) Attend BHWG meetings when requested.

(b) Conduct weapons certification and training required for depredation activities in conjunction with the Natural Resources Manager for the appropriate BDDT personnel.

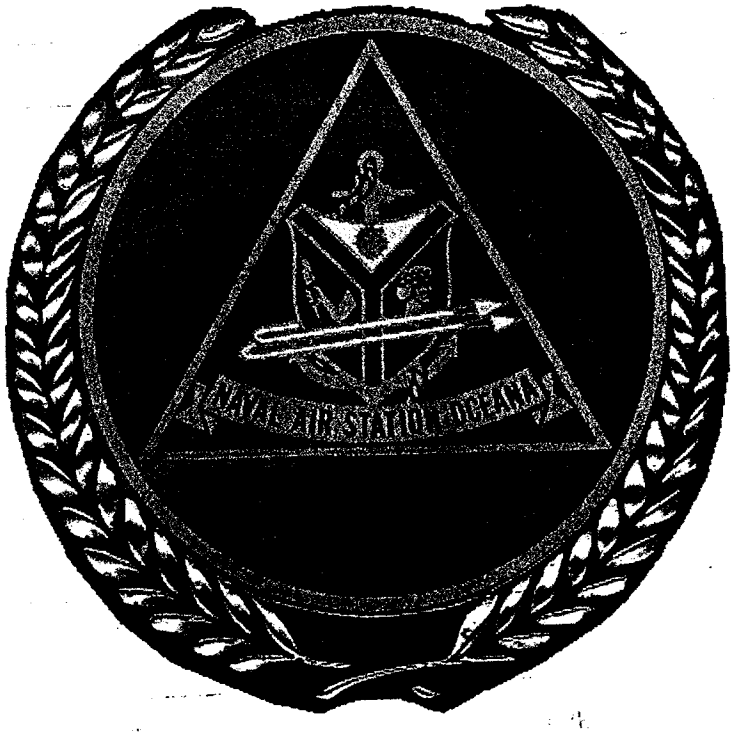
6. Review Authority. The Natural Resources Manager, Regional Engineer Environmental Group is responsible for the review and update of this instruction.

W. C. ZOBEL

Distribution:
NASOCEANAINST 5216.1V
LISTS I, II, III (50, N041VB, 22, N05VB, 15, 42E1, 42GG1, 42J1, 42L1, 42L2 only) and V
COMNAVREG MIDLANT (Regional Engineer)

BASH PLAN

NAS Oceana and NALF Fentress



Atlantic Division

Naval Facilities Engineering Command

March 1999

ENCL (1)

BIRD AIRCRAFT STRIKE HAZARD (BASH) PLAN

FOR

NAVAL AIR STATION OCEANA, VIRGINIA BEACH, VIRGINIA

AND

NAVAL AUXILIARY LANDING FIELD FENTRESS CHESAPEAKE, VIRGINIA

Prepared for

Atlantic Division Naval Facilities Engineering Command
Norfolk, Virginia

Prepared by

Geo-Marine, Inc.
Newport News, Virginia

March 1999

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1.0 INTRODUCTION

Each year thousands of bird and wildlife strikes to civilian and military aircraft throughout the United States are reported. These strikes result in hundreds of millions of dollars in damage as well as lost aircraft and, more importantly, lost lives. Damage estimates for these strikes exceed $200 million annually in direct losses. The National Transportation Safety Board (NTSB) officials estimate the indirect costs (airframe out of service, rescheduling flights, passenger reimbursements, and loss of customer confidence) may easily double or triple this figure. Naval Air Station (NAS) Oceana and Naval Auxiliary Landing Field (NALF) Fentress are geographically situated in a region of the country that is home to many potentially hazardous bird and wildlife species. Strike hazards vary by season, altitude, weather, and surrounding land use. Bird migration periods are usually the greatest concern. The installation is also home base for a variety of jet aircraft that operate in all weather conditions at speeds too great for birds to avoid.

The US Navy Bird Aircraft Strike Hazard (BASH) reduction program is implemented under the authority of NAVFACINST P-73. The NAS Oceana BASH Plan for NAS Oceana and NALF Fentress identifies specific management issues and designates program responsibilities. The purpose of this plan is to further elaborate on the specific responsibilities assigned to the NAS Oceana Natural Resources Manager, to provide management recommendations for the near term, and to assist in developing long term goals to reduce bird and wildlife strikes to aircraft.

A comprehensive management plan to reduce bird and wildlife hazards at these installations must include a full understanding of aircraft safety issues and careful coordination with the Integrated Natural Resources Management Plan (INRMP). The NAS Oceana BASH Plan should be periodically reviewed along with the INRMP to ensure that projected land uses and management strategies are compatible with BASH reduction efforts.

2.0 STRIKE REPORTING AND BACKGROUND STATISTICS

Bird strike data collected by the Federal Aviation Administration (FAA), the US Air Force, and the US Navy are compiled annually and are periodically available from each agency. US Air Force and US Navy strikes are required to be reported, while bird and wildlife strikes to commercial and general aviation aircraft are reported on a voluntary basis. The FAA and the NTSB estimate that reporting on the civilian side may approach only 30 percent of the actual number of strikes.

2.1 Bird Strike Data

Bird strike data for NAS Oceana and NALF Fentress were obtained from the Air Operations Branch, Naval Safety Center. Data from 1981 to 1996 were analyzed to determine trends. Strikes reported by year at NAS Oceana appear to show a significant downward trend since 1989 (Figure 2.1). This trend may reflect an actual decrease in birds at the installation, or changes in reporting procedures and program emphasis within the flying units.

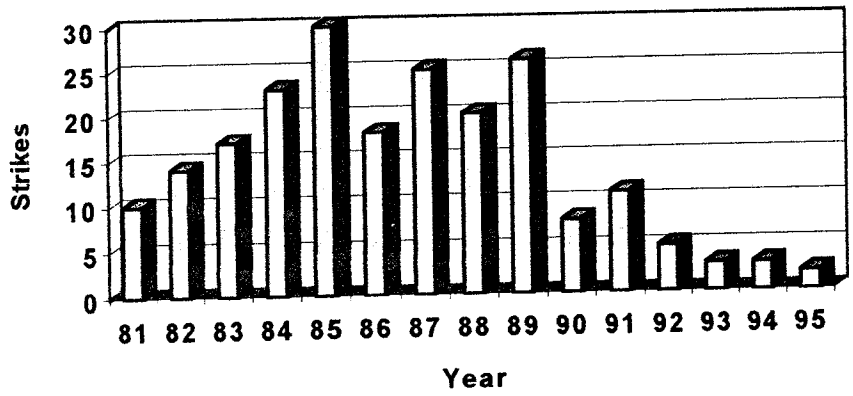


Figure 2.1. Bird Strikes by Year at NAS Oceana.

Monthly strike trends for all combined years (Figure 2.2) are typical of most military and civilian installations. Such trends show a small increase during the spring months and a larger peak in the fall. This distribution is commonly explained by influence of migratory bird activity in the region.

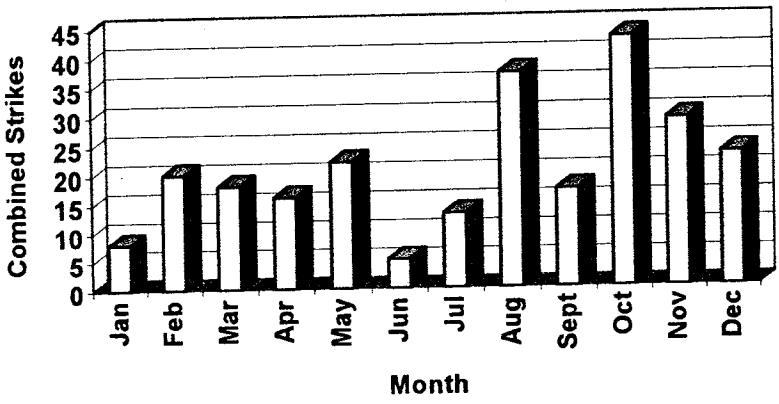


Figure 2.2. Combined Strikes by Month for 1981 - 1996 NAS Oceana.

Figure 2.3 depicts strikes by phase of flight. Forty-three percent of the reported strikes occurred during low-level and range operations. This percentage is higher than the approximate average of 25 to 30 percent reported by military flying units worldwide. One possible explanation may be that most of the low-level training areas are near the Atlantic Coast where the probability of striking both migratory birds and shorebirds (such as gulls) is increased. Another possibility is that aircraft operating in these training areas are traveling at a higher rate of speed than in the airfield traffic pattern and the resulting impact energies are dramatically increased along with the possibility of damage. These damaging strikes are always reported. Non-damaging strike reports may not always find their way to the database, resulting in a slight skewing of the data.

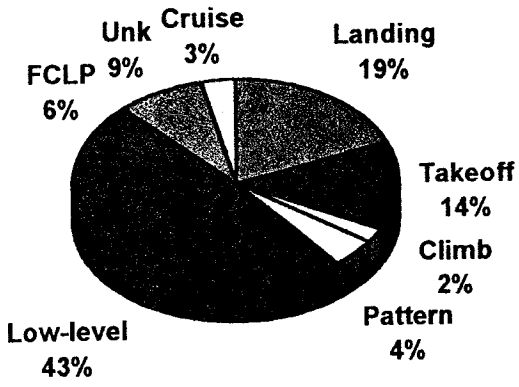


Figure 2.3. Strikes by phase of flight at NAS Oceana.

Strikes reported at NALF Fentress (Figure 2.4) also show a drop beginning in 1990. The lack of any strikes in 1992, 1993, and 1994 suggest that reporting was not complete.

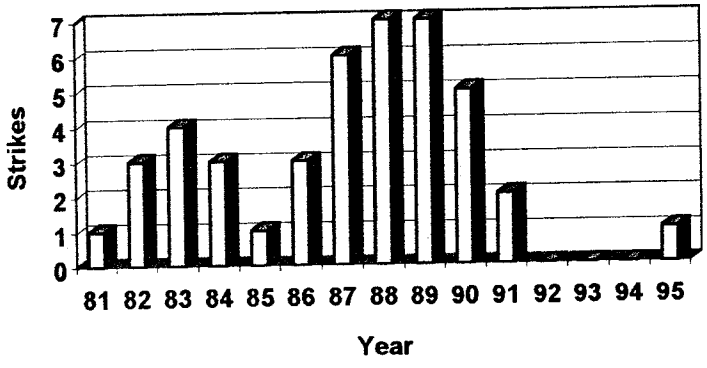


Figure 2.4. Bird Strikes by Year at NALF Fentress.

Average strikes by month (Figure 2.5) for the years 1981 through 1996 show the typical distribution expected in North America. October is the month when bird strike activity is greatest. Fall migration is the most problematic period.

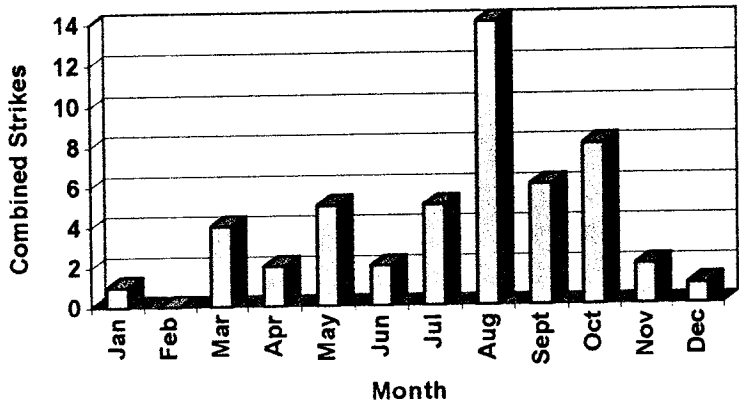


Figure 2.5. Combined Strikes by Month for 1986 - 1991 NALF Fentress.

Strikes by phase of flight (Figure 2.6) are typical for a training airfield, with more strikes reported during approach/landing phases than on takeoff/departure phases. This is generally explained by the higher airspeeds and the shallow angle of attack associated with landing that results in aircraft being at lower altitudes for longer periods of time. Relatively few of the strike reports identified the species of bird involved, but gulls were the most commonly mentioned group. The value of these data could be greatly improved by identifying the phase of flight for all strikes and the species of bird or other wildlife involved.

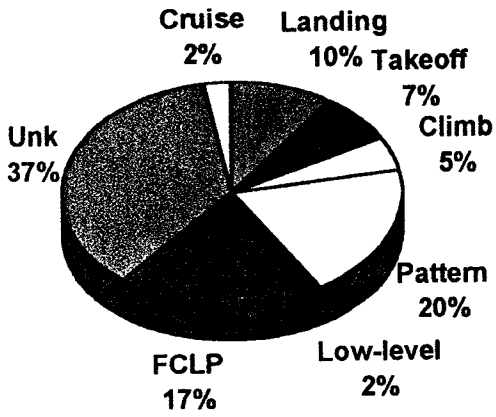


Figure 2.6. Strikes by Phase of Flight at NALF Fentress.

2.2 Reporting Procedures

One of the greatest challenges facing the NAS Oceana BASH reduction program is encouraging flying squadrons to report bird strikes. To further this effort, periodic briefings should be given during squadron safety meetings that include advisories of seasonal bird hazards as well as the importance of bird strike reporting. Additionally, aircraft maintenance personnel and airfield facility maintenance personnel should be briefed periodically on bird strike reporting and collection of feather remains. The Aviation Safety Officer at NAS Oceana will be responsible for collecting strike reports and forwarding them to the Naval Safety Center in accordance with OPNAVINST 3760.6Q.

Bird and wildlife strike reports are a critical component of any comprehensive control program. Identification of species, time of year, and time of day provide important information for development of on-site control programs, operational changes to avoid periods of peak bird activity, and for the development of bird strike resistant aircraft components.

2.3 Bird Remains Identification

Non-fleshy bird remains taken from aircraft or airfields following all bird strikes are not to be discarded and must be forwarded to the Natural Resources Manager for positive identification. Remains from all bird strikes should be identified to species, if possible. The Natural Resources Manager and staff will collect and process feathers for identification. If local identification is not possible, it may be necessary to contact Dr. Carla Dove, Smithsonian Institution, Department of Birds, for positive identification. Dr. Dove may be contacted at (202) 356-2334. For best results, place non-fleshy remains in a plastic zip-lock bag (never use tape to secure feather material to a piece of paper). Include the General Use Naval Aviation Bird Strike Hazard Report (in accordance with OPNAV 3750.6Q) which includes:

- Hazard report number
- Type of aircraft involved and squadron
- Date of strike
- Geographic location and altitude at time of strike
- Installation and state from which remains are shipped
- Damage amount

3.0 NAS OCEANA BASH PROGRAM RESPONSIBILITIES

The installation BASH Plan tasks a number of offices and agencies with certain responsibilities (see below). These organizational offices and personnel were visited as part of the development of this plan to obtain consensus their roles and responsibilities.

The **Bird Hazard Working Group** (BHWG) is the most important BASH reduction organization on the installation. Detection and reporting are a primary function of this

group. Chaired by the Aviation Safety Officer, the group meets as part of the monthly safety meeting and brings together all of the installation agencies and units that have a role in the BASH reduction effort. The NAS Oceana Natural Resources Manager will generally have the most input into this meeting as a result of conducting periodic inspections of the airfield and surrounding habitats. Additionally, the Natural Resources Manager will have access to the bird strike database and will best be able to interpret trends in bird and wildlife strike hazards from these data. To fully support the NAS Oceana BASH Program, the Natural Resources Manager must understand the role that each installation organization has in the program as outlined below.

The Aviation Safety Officer ((757) 433-2811) will:

- Serve as the Chairman of the BHWG.
- Provide periodic review of BASH Regulations.
- Serve as liaison to all NAS Oceana and NALF Fentress activities.
- Coordinate and prioritize requests for low-level bird hazard assessments from the aviation squadrons.
- Conduct periodic inspections of the airfields to identify potentially hazardous bird/wildlife conditions.
- Maintain and report records of hazard bird/wildlife reports from aircrew (in accordance with OPNAVINST 3750.6Q).
- Provide appropriate maps of low-level training routes, ranges, and MOAs depicting reported strikes, as well identifying landfills, wetlands, wildlife refuges, and other potential bird attractions.
- Establish procedures for aircrews to avoid identified hazards during low-level flight operations.
- Provide copies of bird strike reports to the installation Natural Resources Manager.

The Natural Resources Manager ((757) 433-3438) will:

- Serve as a member of the BHWG.
- Obtain and maintain any required federal or state permits for depredation of wildlife.
- Maintain copies of all bird strike report records/forms from NAS Oceana and NALF Fentress units and develop trend analyses.
- Process, store, and/or identify all bird/wildlife strike remains.
- Coordinate and assist the Aviation Safety Officer with dissemination of bird/wildlife strike hazard information.
- Identify airfield habitats that require modification to reduce bird/wildlife attractions consistent with runway lateral and approach zone management criteria, and coordinate modifications with Public Works and the Base Civil Engineer.

- Review and coordinate agricultural outleases to reduce bird/wildlife attractions, especially when fields are being plowed and crops are ripe for harvest.
- Notify the Airfield Facilities Division, the Aviation Safety Officer, and Air Traffic Control when birds/wildlife are being dispersed from agricultural fields on the installation and outside the installation.
- Provide aircrew briefings on seasonal bird hazards.
- Conduct periodic inspections of the airfields to identify bird/wildlife activity.
- Assist in training Airfield Facilities Division personnel on safe and effective bird/wildlife control procedures.
- Coordinate all efforts to remove/control all bird/wildlife hazards on the installation.
- Assist the bird scare group in developing effective techniques in active bird control.

The Airfield Facilities Division Officer ((757) 433-2240) will:

- Serve as a member of the BHWG.
- Conduct daily inspections of the runways and flightline areas to identify bird/wildlife activity.
- Ensure trained personnel are designated and available to disperse birds and wildlife (bird scare group).
- Store and maintain necessary pyrotechnics and other bird dispersal equipment.
- Investigate all bird/wildlife strikes and collect remains and associated information.

The Air Traffic Control (ATC) Division Officer ((757) 433-2318) will:

- Serve as a member of the BHWG.
- Issue bird hazard warnings via ATIS and Ground/Tower radio frequencies when hazardous bird/ wildlife activities are observed.
- Notify the Airfield Facilities Division Officer when active dispersal of birds/wildlife is required.
- Coordinate with weather forecast personnel to identify large scale bird movements using the Next Generation Weather Radar (NEXRAD/WSR 88-D) and issue appropriate bird hazard advisories.
- Include bird hazard advisories as part of the weather briefing.

The Public Works Pest Control ((757) 433-2938) will:

- Assist in the control of birds that present a health hazard in occupied buildings and hangars.

- Maintain appropriate certification necessary to apply repellents and/or toxicants for bird control.

The Security Division Officer ((757) 433-3103) will:

- Schedule and conduct training for the personnel assigned to the bird scare group for appropriate weapons certification required for depredation activities.
- Provide storage and maintenance of weapons and ammunition required for depredation activities.

Aviation Squadrons will:

- Report hazardous bird activity observed away from the installation to the Aviation Safety Officer and Natural Resources Manager.
- Coordinate with the Aviation Safety Officer to brief aircrew periodically on bird and wildlife hazards.
- Deliver all bird strike remains to the Natural Resources Manager for processing and identification.
- Submit a copy of all bird/wildlife strike reports to the Aviation Safety Officer and Natural Resources Manager.
- Request low-level airspace evaluations from the Aviation Safety Officer and make them available to mission planners.
- Post current bird hazard activity on a status board and inform all aircrews of any change in status.

4.0 HABITAT MANAGEMENT (PASSIVE CONTROL)

Bird and wildlife control programs are commonly divided into passive and active methods. Passive methods or habitat management attempt to minimize the attractiveness of the airfield by reducing or eliminating features that provide food, water, cover, breeding sites, or loafing areas. Habitat management strategies are generally the most successful bird/wildlife management programs because they are in place year round and often do not require hourly efforts. Additionally, these methods are less invasive than active methods and are often viewed as environmentally friendly.

4.1 Airfield Turf

Careful management of airfield turf can reduce the numbers of gulls and blackbirds that may feed or loaf near the runways. It is internationally recognized that long grass (7-14 inches) will significantly limit potentially hazardous bird populations. The purpose of long grass is to limit the birds' field of vision and subsequently disrupt the visual security of the flock. Additionally, long turf makes foraging for food items more difficult and is consequently less attractive. Few bird species are able to use grass as a food source,

however, they find the seeds and insects associated with flowers very attractive. To further reduce the attractiveness of airfield turf, grass should be cut prior to the development of seed heads if possible. The airfield turf at NAS Oceana and NALF Fentress is a mixture of various grasses including Bermuda, fescue, Johnson grass, and rye grass. The turf is maintained long, but some areas have grown beyond the 14 inch height, and are producing seed heads. A variety of broadleaf weeds that produce seeds and attract insects are also present. In some areas the turf is beginning to form clumps due to the excessive height which creates a more attractive habitat for rodents. Herbicide treatment to remove grass along the side of runways and taxiways, especially around marker lights, has resulted in soil erosion and development of ground bird nesting habitats.

4.2 Warm Season Grasses

NAS Oceana has experimental areas for establishing native warm season grass species as a source of food and cover for wildlife. These areas should be carefully monitored for rodents and other potential food sources such as seeds and insects. Extreme caution should be exercised when these grasses are located within 1,000 feet of any paved runway/taxiway surface. Prescribed burns have been used on these plots to encourage development of warm season grasses and control woody vegetation. Burning in the airfield vicinity may temporarily increase BASH potential in the local area, and appropriate procedures should be taken for detection and dispersal of hazards. Burned areas expose insects and temporarily become attractive feeding areas. The tall grasses also provide bedding cover and can be attractive deer bedding areas. It should be noted that habitat transition zones between airfield turf and other vegetation (tall grasses, shrubs, and forests) create what is commonly recognized as an "edge effect" that is attractive to many species of birds and other wildlife.

4.3 Standing Water

Many bird species are attracted to standing water for bathing and feeding. The attraction to fresh water sources is particularly acute in coastal marine environments where birds such as gulls typically feed on food items with high salt content. Standing water also attracts insects, reptiles, and amphibians which are excellent food items for many birds. Areas with standing water will also eventually succeed in establishing emergent aquatic vegetation such as cattails which provide both cover and nesting opportunities for several species of birds known to cause damage to aircraft. Drainages within the airfield and clear zones on NAS Oceana and NALF Fentress are necessary to control stormwater runoff but should be managed to reduce standing water adjacent to runways and taxiways. Standing water on paved surfaces should be reduced by using street sweeping equipment as soon as possible after precipitation events. Drainages and other wetlands on NAS Oceana and NALF Fentress are shown in Appendix A.

4.4 Old Runways/Taxiways

The old paved surfaces on portions of abandoned taxiways at NAS Oceana and NALF Fentress are overgrown with weeds. Additionally, the pavement has broken due to erosion and periodic freezing and thawing. The result is a patchy, broken habitat with many small rocks. This is ideal habitat for killdeer, a species of bird common to airfields. Killdeer often nest in the unswept overrun areas and along the side of runways and taxiways. Gulls tend to use these open areas for loafing during the day and roosting. The broken rock and gravel in these areas also provide a source of grit that is an integral part of bird digestion and will attract flocking species such as doves and starlings especially in late afternoon periods.

4.5 Agricultural Outleases

FAA Advisory Circular 5200.33 identifies agricultural activities near airfields as potentially hazardous. Crops may attract birds directly by providing food sources such as grain crops, and indirectly by exposing insects and other invertebrates when the soil is being disturbed by cultivation. Both NAS Ocean and NALF Fentress have fairly extensive agricultural fields near the airfield with corn, soybean, and wheat planted in rotation. A particular situation of concern occurs when crops surrounding the airfields are harvested late in the year (November) and the remaining stubble attracts large concentrations of migrating geese during the winter. During periods of agricultural activity and other periods of concern, detection and reporting must be heightened to minimize BASH. While some bird species are attracted to the crops, the severity of a hazard posed by the presence of the crops is unquantified. Agricultural fields at NAS Oceana and NALF Fentress are presented in Appendix A.

4.6 Golf Course

Golf courses are identified in FAA Advisory Circular AC 5200 as potentially incompatible landuses with airports due to their inherent wildlife attractions. The Golf Course at NAS Oceana provides a variety of attractive habitat for birds, especially Canada Geese. These birds are attracted to the short and well fertilized grass grown on the golf course and will feed and loaf freely with little fear of golfers. Additionally, geese and other waterfowl are often attracted to water hazards on the golf course. Once a flock of geese take up residence on a golf course, they are extremely difficult to remove. Geese and other large flocking birds should immediately be dispersed from the golf course. Under no circumstances should a population of resident geese be allowed to establish on the golf course.

4.7 Fishing

NAS Oceana has an active recreational fishing program at Oceana Pond. This pond as well as Dump Pond and the VACAPES borrow pit pond support a variety of bird species, but bird numbers recorded during field visits were low and bird movements did not

appear to create significant bird hazards. However, if large wading birds such as herons and egrets begin using these ponds regularly, the BASH potential could greatly increase. Currently shallow water habitat for wading birds does not exist because the ponds are dugout borrow pits with steeply sloping sides.

5.0 MANAGEMENT, DISPERSAL, AND DEPREDATION (ACTIVE CONTROL METHODS)

Active control methods include the harassment and dispersal of birds and wildlife using a variety of noise-making devices along with the occasional use of lethal methods (depredation). These methods will periodically be required at NAS Oceana and NALF Fentress due to the coastal habitat in the region and the general attractiveness of runways, taxiways, and ramp areas. Additionally, careful habitat management will increase the effectiveness of active control methods. Specific areas of concern at NAS Oceana and NALF Fentress may be identified by using coordinates on the installation crash grid map or by using a global positioning system (GPS).

Effective management, dispersal, and depredation of wildlife for BASH reduction requires a thorough understanding of species involved and potential hazards under various situations. Proper training and experience result in the skills necessary for active control of potentially hazardous wildlife.

5.1 Birds

A variety of potentially hazardous bird species occurs in the vicinity of NAS Oceana and NALF Fentress. Appendix B of this plan has a list of birds observed during the May 1997 survey. Species specific information for BASH programs is provided in Appendix C.

Gulls represent the greatest potential hazard at NAS Oceana due to their size and flocking behavior. The airfield is located near the coast and will be particularly attractive during winter months when birds will seek refuge on runways, taxiways, and ramps during periods of inclement weather. Gulls will also loaf in short turf when dispersed from the paved surfaces. Some gull species (such as the Laughing Gull) will be attracted to agricultural areas when the soil is being cultivated and may also be attracted to the emergence of some insect species such as grasshoppers.

Blackbirds (including the European Starling, Rusty Blackbird, and Red-winged Blackbird) and geese (including Canada and Snow Geese) also present a potential hazard to aviation at NAS Oceana and NALF Fentress. These birds form very dense flocks during winter months and are attracted to airfields for loafing and feeding in short turf areas. The agricultural activities near the airfield may also periodically attract blackbirds and geese. Flocks will be attracted when grain crops are ripe and when the soil is turned during plowing operations. During these periods of time, extreme caution should be exercised and active bird control procedures must be implemented.

Turkey Vultures may also periodically visit the airfield. These birds pose a severe hazard to aviation due to their body weight, which may exceed 4.5 pounds, and their soaring flight behavior which, may allow them to linger in the pathway of aircraft for extended periods of time. Turkey Vultures are scavengers and are attracted to dead and decomposing animals. Their numbers may become dense when soaring over a food source such as roadkill or a field-dressed animal during hunting season. Dead animals should be immediately removed from the vicinity of the runways and taxiways to reduce vulture attraction. Additional information on bird species is provided in NAVFAC P73.

Back Bay National Wildlife Refuge (NWR), Macky Island NWR, Plum Tree Island NWR, Eastern Shore NWR, and the Dismal Swamp NWR are located in the vicinity of NAS Oceana and NALF Fentress. These areas are maintained to attract to a wide variety of wildlife species and are good sources of information for the arrival and departure times of many migratory bird species. The location of these wildlife areas are depicted on the regional hazard map provided in Appendix A.

5.2 Deer

With several documented strikes and loss of aircraft, deer control is a high BASH priority at NAS Oceana and NALF Fentress. Deer are routinely observed in the vicinity of the runways by ATC personnel and Airfield Facilities staff at both installations. NAS Oceana and NALF Fentress have excellent deer management programs. Monthly spotlight surveys have greatly increased awareness of the issue, and managed hunting pressure has significantly reduced the deer populations at both installations. However, due to the uncertainty of deer behavior in the immediate vicinity of runways and taxiways, additional control measures may be warranted. Additionally, increased urbanization of lands surrounding both installations may result in deer seeking refuge in areas near the airfield. Several additional risk management issues must be considered to reduce further the probability of a serious strike.

- The most effective deer control measure would be the installation of a perimeter fence around the active aircraft movement areas at NAS Oceana. Installation of the fence would provide a barrier to deer movements, especially during hunting season when deer are most active. This fence should be a minimum of ten feet high with a top spreader bar with two to three lines of barbed wire. Installation should include requirements to secure the fence to the ground with less than two inches of clearance. In areas where such clearance is not practical, steel reinforcement bars should be installed vertically with less than four inches of clearance between the bars. A clear zone adjacent to the fence would be desirable to allow for security checks and periodic maintenance. Design of the fence would have to allow for clearance requirements for aircraft operations, provide necessary security and rescue access, and not interfere with electronic equipment on the airfield. A rough estimate for this effort would include approximately 48,500 feet

of fencing at a cost of approximately $1,212,500. Annual maintenance for this fence should be included when considering this option.

- If no perimeter fence is feasible, the Quality Deer Management (QDM) program may have to shift from management of deer populations to removal of deer through sustained depredation efforts in areas near the runways and taxiways. Food plots that are situated near runways, taxiways, and overrun areas should be removed and replaced with less attractive vegetation. Managing deer populations with recreational hunting should be restricted to areas where deer do not have unimpeded access to aircraft movement areas. Unimpeded access would include areas where deer do not have to cross a major roadway, jump over or crawl under a fence, or pass through an industrial or densely populated urban area.

5.3 Other Wildlife

Mammals such as feral dogs and fox may periodically pose a threat to aviation at NAS Oceana and NALF Fentress. As soon as these animals are identified, immediate efforts should be made to remove them from the airfield environment. This may be accomplished either by live trapping, shooting, or other lethal methods. These efforts, however, may result in adverse public relations and care should be taken to ensure that the animals are not pets that have escaped from family housing onto the airfield. It also may be possible to use the services of the US Department of Agriculture, Wildlife Services, and the Virginia Beach Animal Control office. Feral dogs pose a direct threat to aircraft safety by running across the runway and indirectly by frightening other species such as deer across the path of aircraft.

5.4 Dispersal Methods

At NAS Oceana, staff from the Airfield Facilities Division will perform active bird control with assistance from the Natural Resources Division. At NALF Fentress, this service will be provided by the Crash/Rescue Team. A logbook should be maintained by all offices tasked with active control efforts. This log should contain as a minimum:

- Date
- Time
- Weather conditions (temp, winds, cloud cover)
- Location of birds
- Type of control used
- Response of the birds
- Name/signature of control staff member

The proper and safe use of active control methods is imperative. However, individual experience will result in some personal variations in effectiveness. Bird dispersal techniques vary in their effectiveness with different species and under various weather conditions. Additionally, seasonal and daily behaviors of birds may also influence the effectiveness of active dispersal. Dispersal methods may be divided into several categories including auditory, visual, and chemical. Chemical repellents are used for

specific problems such as the control of earthworms with the fungicide benomyl or the use of methylanthranilate for repelling gulls from pools of standing water. The use of chemical repellents is not recommended for NAS Oceana or NALF Fentress. Auditory dispersal methods include the use of noise-making devices such as pyrotechnics, propane cannons, bioacoustics, and artificial noise generators. Visual dispersal includes the use of scarecrows, flags, streamers, balloons, and model birds such as predators (owls) or gulls in distressed positions. While many of these methods have anecdotal support, most achieve only minimal effectiveness due to habituation. The overall effectiveness of any dispersal program relies on the skill, persistence, and willingness of the bird control staff. If used carefully and persistently, the methods listed below should provide sufficient tools for bird control efforts at NAS Oceana and NALF Fentress. A list of recommended equipment for each installation and sources for control equipment and vendors are located in Appendix D.

Pyrotechnics. Pyrotechnics are a group of noise-producing devices which include firearms or launching systems that deliver various firecracker-like loads. These may be launched from a .22 caliber starter pistol, from a 12 gauge shotgun, or from a modified flare pistol. The .22 caliber system includes screamers which produce a continuous whistling/screaming noise from the time the round has been fired and bangers which launch several hundred feet in the air followed by a single, loud report. The 12 gauge cracker shells fire much like bangers and also produce a loud report.

Pyrotechnics are very effective for the control of gulls, shorebirds, waterfowl, starlings, blackbirds, and doves. Some species, such as killdeer, are difficult to effectively disperse with pyrotechnics as the birds will get up and move only a short distance before landing again. Care should be taken not to fire too many rounds as this tends to allow birds to habituate to the stimulus.

Pyrotechnics should be stored in a cool dry place that provides immediate access to the bird control staff. Rounds should be fired upward with at least a 45 degree angle to insure the round explodes away from the ground. Never aim a pyrotechnic round directly at a bird on the ground. Pyrotechnics should be used in combination (screamers, bangers) to minimize habituation. The .22 caliber systems often eject the primer cap which should be recovered to reduce foreign object damage. The 12 gauge rounds have a tendency to leave powder deposits and require that the gun be cleaned daily after each use. Additionally, wadding from the cracker shell may remain in the barrel after a round is fired. Clearing the barrel is a safe practice.

Treat all pyrotechnic devices as if they were loaded firearms. All personnel using pyrotechnics should be trained in weapons safety procedures. Eye protection, hearing protection, and gloves should be mandatory equipment. If a launcher misfires, point the launcher or gun in a safe direction, place the device on the ground (if practical) and wait at least three minutes before inspecting the breech. Pyrotechnics have internal fuses that may have been ignited even if the round never leaves the barrel. Be aware that

pyrotechnics can start fires if they detonate on the ground, especially during dry periods. A fire extinguisher should be on hand at all times.

Bioacoustics. Bioacoustics are taped distress or alarm calls of birds that are played over an external speaker system. Because these recordings are of actual birds, their calls are species specific. Not all bird species appear to have distress or alarm calls.

The effective use of bioacoustics requires that the bird control staff be trained to identify specific bird species and that the specific tape is on hand. Upon hearing a distress call, many species of birds will simply begin circling in the air, or even attempt to mob the speaker. While this may be initially concerning to the bird control staff, these behavioral responses can be used to lure birds away from the runway before dispersal with pyrotechnics. Successful use of bioacoustics requires some practice and often controllers give up on the method before they find how useful it can be. An additional benefit to bioacoustics is that because it is generally species specific, it may be used in areas where there is concern about disturbing threatened or endangered species.

The quality of the distress call tape is critical. A clear, loud signal must be produced to have a meaningful effect. Subsequently, it is important to have a powerful tape player and or amplifier to broadcast the call. Systems are commercially available or can be pieced together with any quality cassette player/amplifier and external, weather proof speaker system.

Bioacoustic tapes vary drastically by species. Some sources may have high quality tapes for one species but not for another. It may be necessary to procure tapes from several vendors to get a tape that may be played loudly enough to be effective without extensive distortion.

Propane Cannons. Propane cannons can be a very effective bird control device if properly used. These devices were originally developed to assist in bird control in agricultural settings and are used throughout the world. The cannons operate using a portable propane canister that supplies gas to a chamber that is ignited by a flint or piezo-electric ignition system. A variety of brands and options are available, including rotating base, random fire, remote control, and infrared sensors. Stories of failures typically arise when these devices are placed in the same location for extended periods of time and allowed to fire until they run out of gas.

There is no empirically derived figure for the number of gas cannons to be used on any given airfield. Some airfields have deployed a system of up to twenty cannons integrated by computer and remotely triggered from the tower or other remote site. The "Scare Wars" system was pioneered by the Reed-Joseph Company and is deployed at several USAF installations. At NAS Oceana and NALF Fentress, gas cannons with remote firing capability may work well in controlling deer. Several units could be placed pointed towards the wooded area where deer are commonly seen in late evening and early morning hours. Air Traffic Control staff could trigger these devices prior to clearing

aircraft for departure or landing. Propane cannons may also be useful in a line of defense around the agricultural areas when birds are observed attempting to feed on the crops and during periods when the fields are being plowed. During these operations, the random timer may be effective in preventing birds from landing in the fields. Care should be taken not to let the cannons fire for extended periods of time, allowing birds to habituate.

The initial cost of a propane cannon is fairly expensive. Remote control systems are very expensive, but after the initial equipment costs, operations are inexpensive. If heavy equipment is operating near the cannons, it may be necessary to mark the cannon and the propane tank with a flag or tape to prevent the system from being damaged.

It is usually advisable to purchase a propane cannon that rests on a rotating base. This allows the cannon to pivot which results in sound being projected in a variety of directions. This reduces habituation and allows the cannon to remain in one place for a few days before being moved. Additionally, the cannon is raised off the ground reducing the potential fire hazards.

5.5 Depredation Methods

It is commonly thought that lethal means of bird and other wildlife control often reinforce the non-lethal dispersal methods. In some cases (such as with cattle egrets), it may be necessary to remove an individual bird that is persistent on the airfield. Depredation should not be a commonly required method of control at NAS Oceana and NALF Fentress if dispersal methods are effectively implemented.

All migratory birds in North America are protected under the Migratory Bird Treaty Act (MBTA) with the exception of the European starling, the house sparrow, and the rock dove (pigeon). DoD organizations are required to obtain a depredation permit to take any bird protected under the MBTA. A 1997 Department of Justice opinion stating that government agencies are not constrained by the MBTA and government employees, in the course of their official duties, could legally take any bird species that are not protected by the Endangered Species Act is in litigation. The US Navy Policy on Depredation Permits states that Navy commands and installations shall not request a permit when planning or engaging in activities that could result in the unintended taking of migratory birds. However, installations planning or engaging in the intentional taking of migratory birds through depredation or for scientific study should follow MBTA permit requirements (Appendix E). Prior to exercising any lethal bird control methods, the status of this policy should be confirmed by calling Mr. Martin Lowney, USDA/APHIS-WS, (301) 734-7921.

Depredation of deer and other mammal species should be coordinated with Virginia Department of Game and Inland Fisheries officials. Efforts should be made to significantly reduce deer strike hazard potential on both NAS Oceana and NALF Fentress as soon as possible. Depredation efforts should be confined to the airfield and clear zone

vicinity specifically as opposed to an installation-wide effort to eliminate deer. Contact the Virginia Department of Game and Fish (804) 253-7072 for specific information.

5.6 Hangar Pest Control. Several bird species including the house sparrow, European starling, and common pigeon are frequently found nesting and roosting in aircraft hangars and other industrial structures around the airfield. These facilities often provide shelter due to the extensive internal superstructure and elevated ceilings that often prevent easy harassment. While hangar pests are not generally a concern to aviation safety, these birds often generate extensive clean-up efforts and may pose health risks to personnel working in the facilities.

Immediate relief may be achieved by depredation of the hangar pests. The use of a pellet rifle is generally recommended. Care should be taken to find a skilled marksman and all bird remains should be collected and disposed of properly. This method is especially effective on pigeons.

Reducing access to the internal structures by closing doors or hanging heavy plastic strips (such as used in cold storage facilities) will often prevent easy access to the building. Products such as Nixcellite, a strip of sharp metal projections, is often effective in making perches unavailable if properly installed. Thin wires stretched above beams and other flat surfaces can also be effective in reducing perching sites. Extreme situations may call for netting the overhead area. While potentially very effective, this method is very expensive and may increase bird activity if not properly installed and maintained.

The use of toxic perches is not recommended due to possible non-target kills as well as secondary toxicity. Additionally, the use of products such as glue strips, tangle-foot, etc., that involve a sticky substance is not recommended due to relative ineffectiveness and secondary clean-up requirements.

6.0 BIRD AVOIDANCE

Bird Avoidance is a critical component of a comprehensive BASH plan. Bird avoidance includes the Bird Hazard Advisory program on the airfield and bird avoidance during low-level flight operations. Potentially hazardous periods in the region can be identified using the Bird Avoidance Model (BAM) developed by the USAF BASH Team. This risk assessment tool identifies hazardous bird conditions in two-week intervals for the lower forty-eight states. BAM Graphs for the NAS Oceana region are included in Appendix F.

6.1 Bird Hazard Advisories

This program involves the detection of hazardous bird/wildlife on the airfield, risk assessment, communication of advisories, and operational restrictions associated with advisories. The following terminology will be used for rapid communications to disseminate bird activity information and implement unit operational procedures. Bird locations should be given with the following advisory:

- Bird Watch Condition **SEVERE**. Heavy concentration of birds on or immediately above the active runway or other specific locations that represent an immediate hazard to safe flying operations. Aircrews must thoroughly evaluate mission need before operating in areas under condition SEVERE.

- Bird Watch Condition **MODERATE**. Concentrations of birds observable in locations that represent a probable hazard to safe flying operations. This condition requires increased vigilance by all tasked organizations and extreme caution by aircrews.

- Bird Watch Condition **LIGHT**. Normal bird activity on and above the airfield with a low probability of hazard.

6.2 Low-level Bird Avoidance

While relatively few low-level bird strikes have been reported by units operating from NAS Oceana and NALF Fentress, the potential for severe damage to aircraft is greatly increased when aircraft are operating at high speeds at altitudes commonly used by birds. Approximately one third of all bird strikes to military aircraft occur during high speed, low-level flight operations. As birds cannot be controlled along routes, ranges, and Military Operating Areas (MOAs), bird avoidance offers the best solution to reduce the probability of a catastrophic strike. These areas have unique BASH detection and reporting criteria. Each airspace contains areas with potential bird strike hazards.

Evaluations of routes and ranges are the responsibility of Aviation Safety Officer. Each route, range, or MOA should be evaluated for the presence of dense bird activity by time of year and time of day. This information should be consolidated and used for scheduling and mission planning to avoid areas with severe concentrations of birds. Assistance in low-level hazard evaluations may be obtained by contacting the US Air Force BASH Team, Kirtland AFB, NM, DSN 246-5674.

The special use airspace used by NAS Oceana includes MOAs, Warning Areas, Restricted Areas/Target Ranges, and Military Training Routes (MTRs). A wide variety of aircraft within the DoD use these areas for training purposes over a range of altitudes, depending on aircraft, available airspace, and training mission. Each airspace contains areas with potential bird strike hazards.

A number of off-shore warning areas and MOAs are used by aircraft assigned to NAS Oceana. W-72 is located southeast of NAS Oceana and is administered by the Fleet Area Control Surveillance Facility/Virginia Capes (FACSFAC VACAPES), which coordinates the Virginia Capes, Atlantic City, Narragansett Bay, Patuxent River, and Cherry Point operating areas. Most use of W-72 is concurrent and there is no limit imposed on the number of simultaneous sorties. **The VACAPES radar system was evaluated and**

determined not to have bird target identification capabilities. W-368A/B are northeast of NAS Oceana. These are used primarily for missile launches from the National Aeronautics and Space Administration (NASA) Wallops flight facility. W-386D is situated along the southeast edge of W-386A. The Navy uses this area primarily for air-to-air gunnery training. W-122 is a large warning area located south of Cape Hatteras. Aircraft based at NAS Oceana use this area primarily for large strike missions and as a location for air combat maneuvers.

Three ranges are commonly used by NAS Oceana aircraft for air-to-surface target training. These include BT-9 (Brant Island Shoal), BT-11 (Piney Island), and the Dare County Bombing Range. BT-9 is located approximately 150 miles south of NAS Oceana on Brant Island Shoal in Pamlic Sound, Pamlico County, North Carolina. The range is entirely a marine environment that is located approximately three miles off shore of Goose Creek Island. BT-9 is defined by a surface water prohibited area designated by the US Army Corps of Engineers (USACOE) Wilmington District. BT-11 is located in Carteret County, North Carolina, and is used for air-to-ground weapons training. The range is administered by MCAS Cherry Point Range Control. Dare County Range is located in Dare County, North Carolina. The USAF identified this range as one of the most serious potential bird strike areas and has conducted extensive research on bird hazards in the United States. A CD-ROM risk model that provides scheduling information as well as recommendations for flights during hazardous periods is available through the U.S. Air Force, Bird Aircraft Strike Hazard (BASH) Team, at HQ AFSC/SEFW, 9700 Ave G, SE, Bldg 24499, Kirtland AFB, NM 87117-5671, DSN 246-5674.

The USAF Bird Avoidance Model (BAM) for the lower forty-eight states integrates bird distribution and risk using a Geographic Information System (GIS). The BAM-GIS is available through the U.S. Air Force, Bird Aircraft Strike Hazard (BASH) Team, at HQ AFSC/SEFW, 9700 Ave G, SE, Bldg 24499, Kirtland AFB, NM 87117-5671, DSN 246-5674. This program requires ArcView software and will generate maps depicting relative bird hazard risks for low-level training routes. Maps are available in two-week intervals for day, night, and dawn/dusk. While not specifically designed for airfield evaluation, the maps do provide a relative measure of risk in a geographic region throughout the year and may be helpful in planning control activities as well as for awareness training for aircrew. BAM maps for the general geographic region are included in Appendix F. Evaluations for each route/range used by flying units at NAS Oceana should be conducted that include the following:

- Maps which depict low-level routes, training areas, and ranges predominately used by the installation. These maps should be maintained at the Safety Office.

- Maps that indicate where reported bird strikes were documented.

- Analysis of low-level bird strike data to be disseminated to flying units.

- A determination based on bird strike data that addresses future use of potentially hazard airspace.

7.0 BASH TRAINING

The NAS Oceana and NALF Fentress BASH program should be briefed to all flying personnel and support staff at least once each year. The briefing should focus on local conditions as well as national trends. A general outline for training is provided below and general BASH references are listed in Appendix G.

- **General Background and Strike Statistics.** Provide a brief overview of significant bird strike events worldwide over the past five years. A graphic depiction of local strike statistics is helpful and encourages aircrew and ground staff reporting.

- **Review responsibilities assigned in the BASH Plan.** This will assist in clearly marking the lines of authority and responsibilities for all aspects of the BASH program.

- **Habitat Management Issues.** Review the short term and long term goals and explain why each is important in reducing bird/wildlife strikes.

- **Active Bird Control Methods.** Review safety procedures for the proper use of pyrotechnics, distress calls, and propane cannons.

- **Bird Hazard Advisory Conditions.** This topic will generate the greatest number of questions and debate. Compile a list of questions and concerns for discussions at Bird Strike Committee - USA and other meetings.

- **BASH Slide Presentation.** A BASH Slide presentation (35mm) is included in Appendix H, that provides background information on the BASH program. A narrative is included that will allow for development of mini-briefings from the original slide set.

- **BASH Brochure.** A brochure on the BASH Program at NAS Oceana/NALF Fentress is included in Appendix I. This brochure provides general background information on the installation program.

8.0 PROGRAM RECOMMENDATIONS

- **Program Responsibilities**

Ensure participation and fulfillment of responsibilities of all offices and agencies involved in the Bird Hazard Working Group.

- **Observation and Reporting**

Monthly surveys of agricultural fields on and around NAS Oceana and NALF Fentress should be conducted to determine the species, numbers, and movement areas used by birds. Particular care should be taken during harvesting and cultivation. During these times, Air Traffic Control staff should be advised to look for increased bird activity and active frightening procedures should be instated.

- **Active Control Methods**

Obtain and deploy propane cannons in the areas adjacent to agricultural fields to disperse birds identified as hazardous to aircraft.

- **Habitat Management**

The long grass mowing policy for airfield turf should be continued, but it should ensure that turf does not grow to heights that create clumping. Additionally, do not allow the grass to lay over thus creating more attractive habitat for rodents. To minimize mowing costs, a Bermuda grass release program should be implemented that will result in a dense monoculture. This is typically accomplished by selective herbiciding of broadleaf weed species. Details of this process should be discussed with the NAS Oceana Natural Resources Manager and the Facilities Maintenance Division for additional information. Grass around runway lights should be cut rather than removed using herbicides to avoid soil erosion which creates habitat for some bird species. Bare areas or areas impacted by construction activities should be re-seeded as soon as possible with a turf mix that does not provide a food source for birds and other wildlife. Grasses most suitable for NAS Oceana and NALF Fentress are rye, fescue, and Bermuda.

The native warm season grass areas on NAS Oceana should be evaluated for potential seed production, insect attraction (flower production), and rodent usage relative to BASH before widespread implementation.

All drainage ditches within 1,000 feet of the runway on NAS Oceana and NALF Fentress should be cleared of all vegetation and any structures that impede water flow. Following significant rain events, runways and taxiways should be swept to reduce bird attraction to standing water. Any future construction programs on the installations should not result in an increase in stormwater runoff to the runway area. Development of new storm water

retention/detention facilities near the runway should not be permitted. Areas within the airfield and clear zones that continue to hold ponded water following rain events, but not classified as jurisdictional wetlands according to Section 404 of the Clean Water Act, should be filled and seeded.

Old taxiways and other paved surfaces with loose rocks should be cleared by periodically sweeping the areas. Weeds should be killed in the paved areas to reduce the broken habitat and cracks should be filled to prevent further erosion. All unused pavement within 1,000 feet of the runways and taxiways should be removed. Seed should be planted in the bare areas to develop a stand of monoculture grass (use an approved airfield turf mix). Be aware that there may be increased bird activity during the re-seeding process. Ensure that no seed bearing grasses such as millet are used to stabilize the soil during construction projects on the airfield.

- **Golf Course**

NAS Oceana should not allow geese to become residents on the golf course.

- **Fishing**

As part of the fishing program at NAS Oceana, the public must be made aware of the potential attraction of birds to the ponds and signs should be posted encouraging proper disposal of fish remains, care in covering trash cans, and good litter control.

If bird use of the ponds on NAS Oceana increases to the point considered hazardous to aircraft, grid lines should be placed to discourage birds from using the ponds. A grid of monofilament line at five meter intervals approximately one foot above the water should be used. To facilitate recreational fishing, the entire system may need to be elevated or limited to some areas of the pond. Once an effective scheme is developed, monofilament lines may be replaced with more durable steel wires.

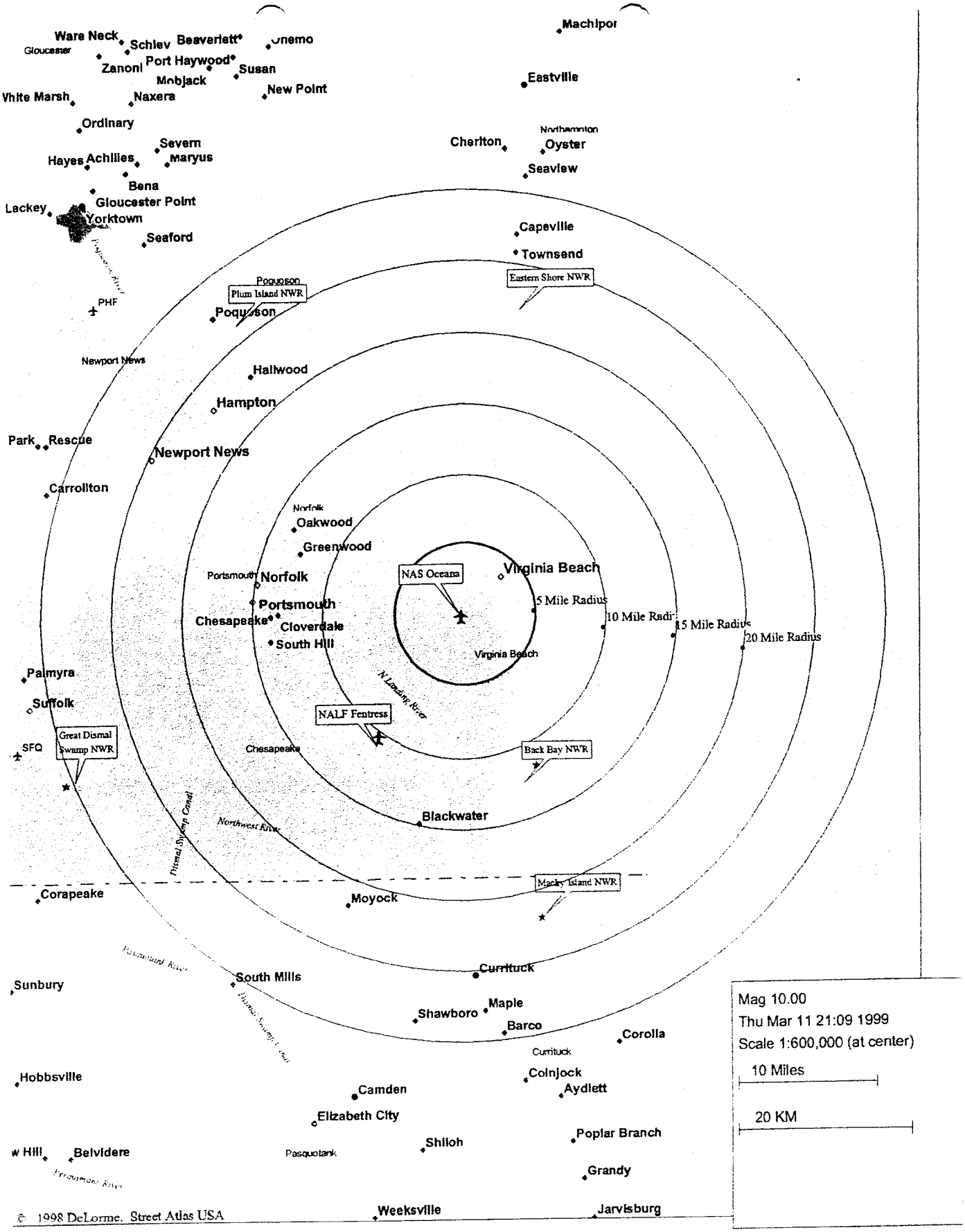
- **Deer**

The Quality Deer Management Program should focus on depredation rather than management in areas where deer have unimpeded access to active aircraft movement. Installation of a perimeter fence would significantly reduce the probability of a serious deer strike and allow for continued recreational deer hunting on the facility.

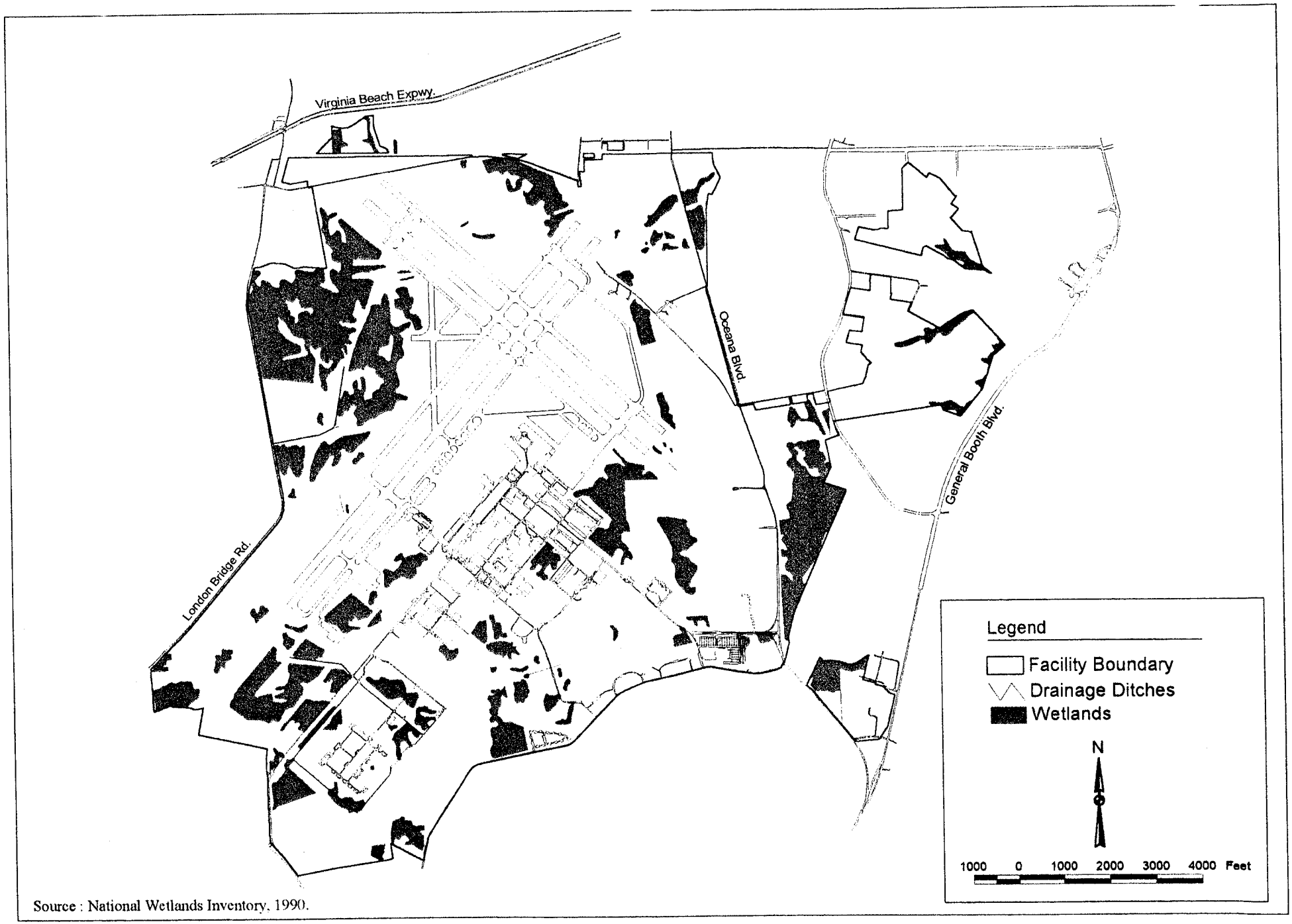
- **BASH Training**

BHWG staff should attend BASH training opportunities to remain current with management developments.

Appendix A
Maps

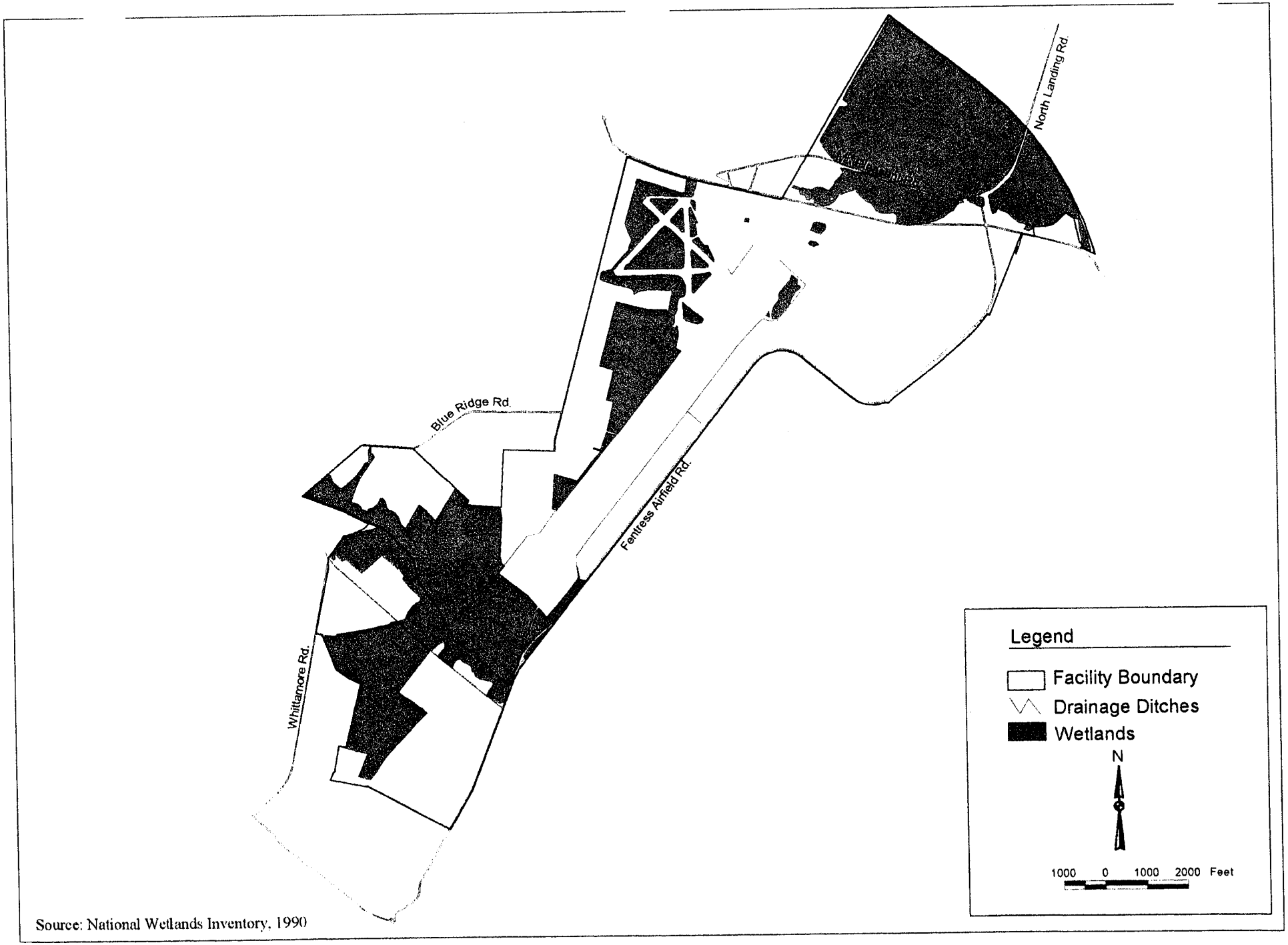


Appendix A, Figure 1. Regional Hazards.



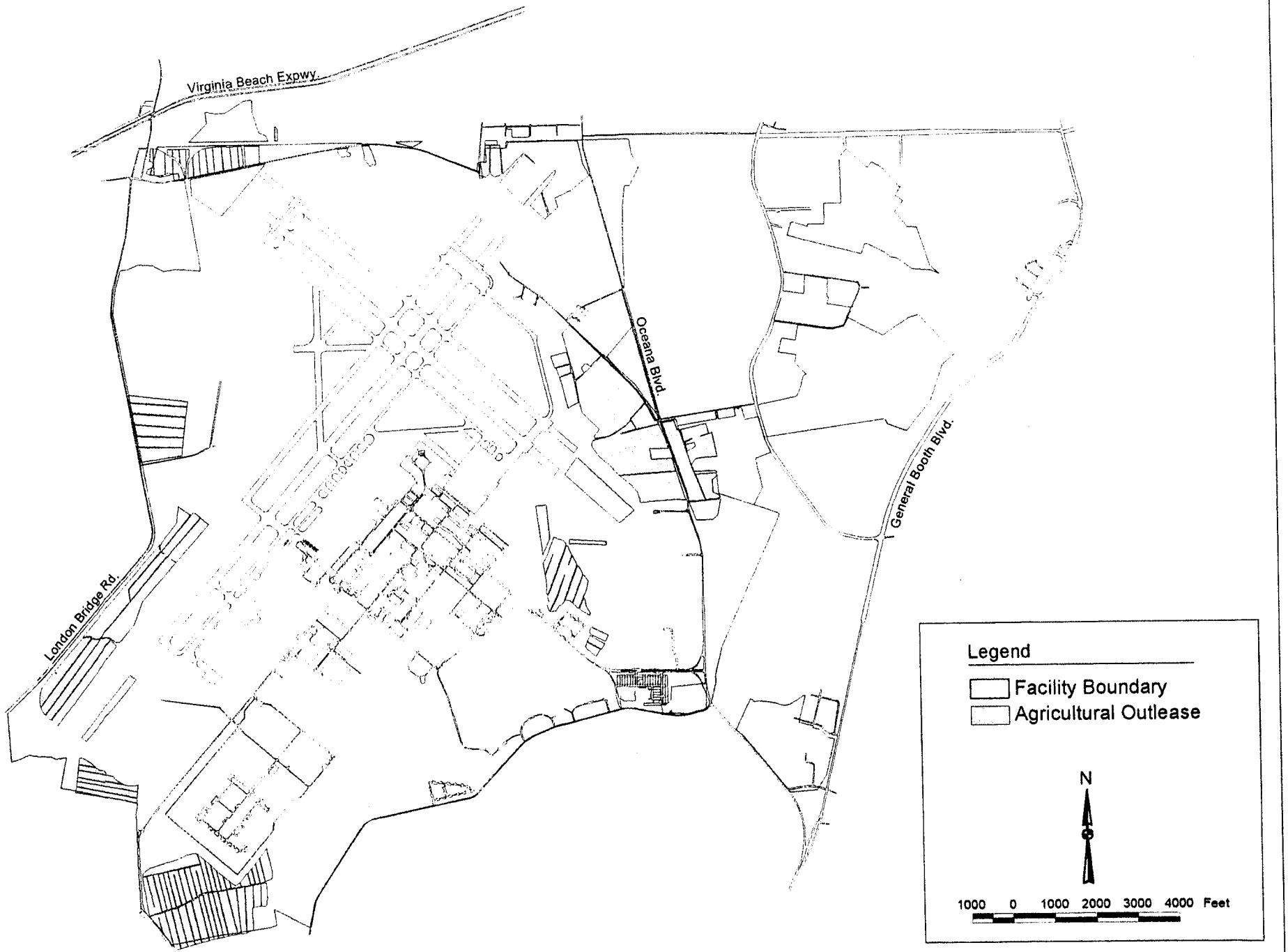
Source : National Wetlands Inventory, 1990.

Appendix A. Figure 2. Wetlands at NAS Oceana.

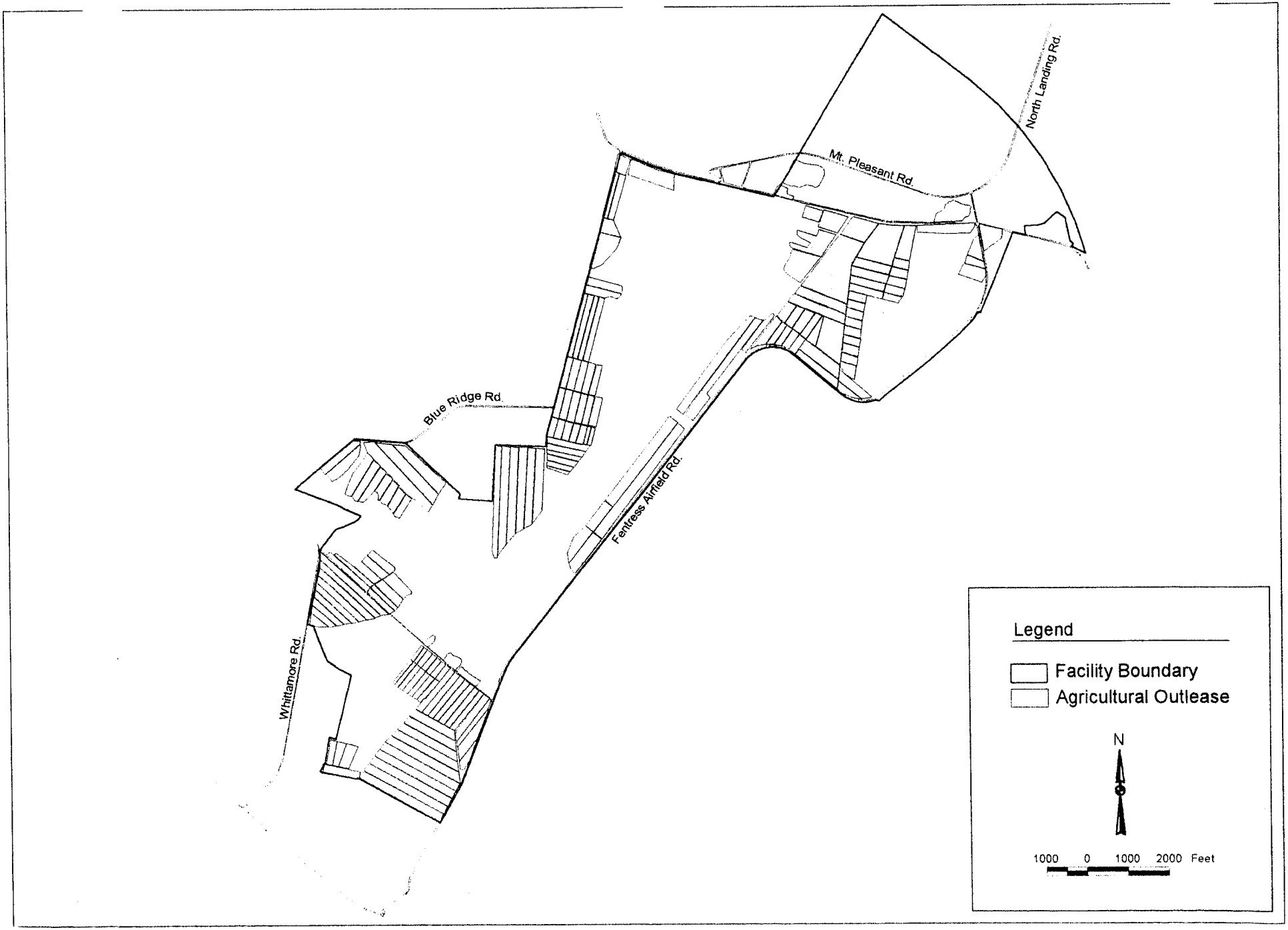


Source: National Wetlands Inventory, 1990

Appendix A. Figure 3. Wetlands at NALF Fentress.



Appendix A. Figure 4. Agricultural Outlease at NAS Oceana.



Appendix A. Figure 5. Agricultural Outlease at NALF Fentress.

Appendix B
Bird List

Appendix B. Birds Observed in the Vicinity of NAS Oceana and NALF Fentress May 1997

Order Anseriformes (Waterfowl)

Canada Goose	*Branta canadensis*
Mallard	*Anas platyrhynchos*

Order Falconiformes (Hawks, Falcons, and Vultures)

Turkey Vulture	*Cathartes aura*
Red-tailed Hawk	*Buteo jamaicensis*
American Kestral	*Falco sparverius*
Osprey	*Pandion haliaetus*

Order Ciconiiformes (Herons and their allies)

Great Egret	*Casmerodius albus*
Cattle Egret	*Bubulcus ibis*
Great Blue Heron	*Ardea herodius*
Green-backed Heron	*Butorides striatus*

Order Gruiformes (Cranes and their allies)

American Coot	*Fulica americana*

Order Charadriiformes (Shorebirds and Gulls)

Killdeer	*Charadrius vociferus*
Herring Gull	*Larus argentatus*
Ring-billed Gull	*Larus delawarensis*
Laughing Gull	*Larus atricilla*

Order Columbiformes (Doves and Pigeons)

Rock Dove	*Columba livia*
Mourning Dove	*Zenaida macroura*

Order Apodiformes (Swifts)

Chimney Swift	*Chaetura pelagica*

Order Piciformes (Woodpeckers)

Common Flicker	*Colaptes auratus*

Order Passiformes (Perching Birds)

Northern Mockingbird	*Mimus polyglottos*
European Starling	*Sturnus vulgaris*
Eastern Kingbird	*Tyrannus tyrannus*
House Sparrow	*Passer domesticus*
House Finch	*Carpodacus mexicanus*
Eastern Meadowlark	*Sturnella magna*
Horned Lark	*Eremophila alpestris*
American Robin	*Turdus migratorius*
Rusty Blackbird	*Euphagus carolinus*
Barn Swallow	*Hirundo rustica*
Blue Jay	*Cyanocitta cristata*
Red-winged Blackbird	*Agelaius phoeniceus*
Brown-headed Cowbird	*Molothrus ater*
Common Grackle	*Quiscalus quiscula*
American Crow	*Corvus brachyrhynchos*

Appendix C
Species Info.

Appendix C. Specific Species Information for BASH Programs

The following is a summary of specific bird strike hazards and recommendations for reducing hazard to flight operations. A brief description of each bird and how each species can be controlled or avoided is included. Control measure will require action by one or more tasked organizations as described in the basic plan. It is very important to know which species is present before control techniques are most effectively applied. An appropriate field guide should be used to aid in bird identification.

1. Loons, Grebes, Pelicans, Cormorants, and Mergansers. These are fish-eating birds. Control is best accomplished by removing fish-producing ponds near the airfield. Removal of the food source is not always possible, though pyrotechnics can be used to effectively frighten the birds from the area. Avoid flying at sunrise and sunset when large flocks, often in formation, can be found flying to and from feeding areas.

2. Pelagic Birds (albatross, petrels, gannets, shearwaters, murres). Control of these birds is nearly impossible since natural predators are rare and the birds exhibit little fear of man or aircraft. Avoid flying near nesting areas during the brief summer nesting period. These huge nesting colonies are located on steep rocky coast lines or on islands where many thousands of birds may be concentrated.

3. Long-Legged Waders (herons, egrets, ibises, storks). Most of these species are attracted to water where they feed on fish, amphibians, reptiles, and arthropods. Control is best accomplished by eliminating the food sources. Steepening the sides of ditches and ponds and removing emergent vegetation will drastically reduce accessibility to food sources. Pyrotechnics should be used to disperse any birds that do occur after habitat modification.

4. Cattle Egrets. These birds have different feeding habitats than other egrets, preferring open fields where they primarily feed on insects. They frequently follow mowers for the insects, which are stirred up. Mowing should be accomplished during non-flying hours when cattle egrets are present. Grass should be maintained between seven and fourteen inches long. Periodic pesticide application may be necessary for insect control. Roost sites should be eliminated on or near base by removing or thinning roost trees and brush, and dispersing the birds each evening with pyrotechnics.

5. Waterfowl (ducks, geese, swans). A distinction must be made between resident and migrating populations.

    a. Resident waterfowl are attracted to an area to breed or feed. Ponds, lakes, and ditches may attract these birds, particularly if these areas contain emergent or submerged vegetation for feeding, nesting, or shelter. Steepening ditch and pond banks and removing vegetation will reduce waterfowl numbers. When possible, drainage of water sources should be accomplished. Grainfields may also attract waterfowl in large numbers and should be eliminated. Pyrotechnics, and gas cannons, are all excellent control techniques. Use of live ammunition or opening

base areas to waterfowl hunting may also be used for control. Resident birds are most active at dawn and dusk, moving at low altitudes to and from feeding areas. Avoid flying near wildlife refuges, ponds, lakes, or rivers with known waterfowl concentrations during these times.

b. Migrating waterfowl are particularly dangerous to flight safety due to the large number and generally higher altitude of the birds. Large flocks of waterfowl travel along traditional flyways to their breeding and wintering grounds during spring and fall. Hugh flocks may stop along the route awaiting favorable weather conditions to continue. Migrating birds are most active from sunset through midnight, with numbers decreasing in the early morning hours. October and November are most hazardous. Avoidance of flying during the evening hours is generally safest. Obtain Bird Avoidance Model (BAM) software from the BASH Team for evaluation and planning low-level routes. Wintering concentration areas should be avoided.

6. Raptors (hawks, falcons, kites, eagles, vultures). These birds can be particularly hazardous to aircraft because of their size and widespread distribution over bases and low-level areas. Raptors (particularly vultures) use thermals to their advantage to search for prey. These birds become active during mid-morning and remain aloft until late afternoon. Avoid areas with thermal-generating terrain such as ridgelines, rolling hills, and near water. Landfills are particularly attractive to soaring vultures. In the fall, raptors migrate by day to areas of heavy winter concentrations in the southern states. Raptors can be controlled by removal of dead animals on the airfield, proper management of landfills, rodent control on airfields, and removal of dead trees and other perching sites on the airfield. Pyrotechnics may be used to frighten raptors from airfield.

7. Grouse, Quail, and Pheasants. These game birds are most effectively controlled through proper grass-height management. Do not allow grass to exceed 14 inches and eliminate all brush and weed patches on the field, particularly if the plants are seed-producing. Pyrotechnics, gas cannons, live ammunition, or periodic hunts can effectively disperse these birds. The killing of these birds outside the normal hunting season requires special permits from the U.S. Fish and Wildlife Service and the state wildlife agency.

8. Cranes. These large birds are most hazardous during migrating periods, particularly in the fall when many thousands of birds may be concentrated in a small area. Avoid flying at dawn and dusk in areas of known concentration. Pyrotechnics can be effectively used on the airfield to disperse these birds.

9. Sandpipers/Shorebirds. The most significant hazard from these birds occurs when large numbers flock in tight groups, particularly during migration and along coastlines. Many of the upland species such as upland sandpipers and buff-breasted sandpipers may nest on airfields in spring and early summer. Flocks in coastal areas can be hazardous and should be avoided. To control these birds, proper grass height

management must be observed. Water puddles should be eliminated and ditch banks steepened to limit access to these birds. Pyrotechnics can be used for all species and some respond well to bioacoustics.

10. Gulls. These birds represent the most significant hazard to aircraft worldwide. Due to their omnivorous feeding habits and preference for flat, open areas to rest, they are commonly found on airfields. Gulls are most active just after sunrise and before sunset as they move to and from feeding areas. Improperly operated landfills are a significant source of attraction for gulls and should not be allowed in the airfield vicinity. Maintenance of grass height between 7 and 14 inches is critical in reduction of gull numbers. Even with this in effect, gulls may inhabit the airfield, particularly during inclement weather. Persistent harassment using pyrotechnics and bioacoustics is necessary to discourage these birds. Occasionally, live ammunition should be used to reinforce these techniques. Other techniques such as gas cannons, radio-controlled model aircraft, and even falconry should be considered if available and cost-effective. Poisoning of earthworms and insects (especially grasshoppers) may be accomplished if these invertebrates are found to attract gulls. Do not allow these birds to establish a habit of using the airfield to feed, breed, or rest.

11. Terns. These are fish-eating, gull-like birds common in coastal areas and on some major river systems and lakes. Avoid flying near areas where these birds may be active, such as nesting colonies or piers in coastal areas. Remove the food source or eliminate fish-containing ponds, if these birds pose a significant hazard.

12. Pigeons and Doves. These birds are seed-eaters and are attracted to seed-producing weeds, grasses, and shrubs. Open areas or bare spots are attractive as resting or feeding sites. Pyrotechnics can be effective in frightening these birds. Proper grass-height management, irrigation, and mowing before grass goes to seed will limit he number of pigeons and doves on the field. Pigeons frequently occur in structures such as hangars. Netting, shooting, and trapping can drastically reduce their numbers in these structures.

13. Owls. Most owls are nocturnal and attracted to rodents as a food source. Rodent control may be necessary on the airfield; proper management of airfield grass will limit their numbers. Remove perch sites such as unnecessary fence posts and dead trees to limit the number of owls.

14. Nightjars (nighthawks, Chuck-willis-widow, etc). These birds are active particularly at sunset when insects are abundant. Little can be done to limit their numbers other than insect control. Avoid flying at times when these birds are abundant, particularly near lakes, streams, or other areas with large insect populations.

15. Woodpeckers. Woodpecker strikes should be extremely rare. These birds are common in forested areas, but generally remain below canopy level. On the airfield, elimination of trees should eliminate strikes with these birds. Migratory birds may be encountered, but are rarely struck.

16. Flycatchers. These birds are present on airfields to feed on insects. Strikes are infrequent, but should not be overlooked. Control is best accomplished by control of insects and removal of perch sites, such as fence posts, tree limbs, bushes, high spots on the field.

17. Horned Larks. These birds are very difficult to control. They are attracted by bare spots, such as along runway sides, where they eat weed seeds and insects. The best defense against these birds is a thick uniform grass with no bare spots. In the southwest, this may not be possible as grass cannot always be maintained. Consider coating bare spots, particularly along runways, with oil-base or asphalt cover. Pyrotechnics can be used, but these birds tend to fly only short distances and settle down. Persistence is the key to success.

18. Swallows and Pratincoles. These birds eat insects in flight and are commonly found above airfields. Fortunately, swallow are adept at avoiding aircraft, but if they present a problem, measures can be taken for their dispersal. Insect control will reduce the swallow numbers and discouragement of nesting will further decrease numbers. Wash mud nests from eaves, culverts, etc., with a hose as the birds begin nesting. Nesting in banks can be discouraged by harassing the birds as they work on building. If swallows are noted resting on runways or taxiways, use pyrotechnics to disperse them.

19. Crows and Ravens. These omnivorous birds are common in open areas and around landfills. These birds may occur in large flocks, particularly at sunset as they return to roost sites. Proper grass-height management will reduce population numbers. Remove any known roost sites or thin individual roost trees. Landfills must be operated in a manner to discourage these birds. Bioacoustics and pyrotechnics can be used to frighten these birds if they occur on the field.

20. Blackbirds, Grackles, Cowbirds, and Starlings. These birds can be particularly hazardous because they frequently occur in huge flocks, sometimes in the millions. Blackbirds and starlings are attracted to flat open areas to feed, rest, or stage/pre-roost. Maintenance of grass height between seven and fourteen inches is the best means of reducing airfield blackbird and starling numbers. Do not allow seed-producing plants to grow on the airfield nor outlease grain crops in areas where these birds are known to occur. Roost sites must be eliminated near the flightline. Selective pruning or removal of roost trees, brush, or cattails must be accomplished if blackbirds and starlings are roosting on base. Blackbirds and starlings respond well to an intense frightening program using bioacoustics and pyrotechnics. Other methods should be used to supplement this program as necessary. Starlings are not federally protected and may be killed without permits. Permits are required for other species. Occasional shooting of birds will reinforce other frightening techniques. Poisoning or trapping may also be considered. U.S. Fish and Wildlife Service assistance is recommended. If these birds occur in hangars, toxic bird perches are recommended to eliminate the problem. Strictly avoid flying near known blackbird and starling roosts, especially at sunrise and sunset and during spring and fall

migration. Huge roosting colonies may also be present during winter months in southern states.

21. Meadowlarks. These birds occur on nearly every airfield and are attracted to grasslands and low weeds. Eliminate broad-leafed weeds and maintain grass height at 7 to 14 inches. Elimination of suitable perching sites, such as fence posts and brush, will also aid in reduction. Pyrotechnics can be used, but meadowlarks usually only fly a short distance before settling down again. Persistence is the key to success.

22. House Sparrows. These birds are not frequently struck by aircraft, but are common pests around structures. House sparrows often nest in hangars and dense shrubs and trees. These birds are not protected by law and may be killed without permit. Toxic bird perches may be used to remove house sparrows from hangars or other structures. Frightening techniques are usually ineffective against these birds.

23. Warblers. The wide range of species of warblers thrive in a variety of habitats. Most prefer shrubs, trees, or riparian habitats where they feed, breed, or rest. The habitat types should not be allowed on the airfield and warbler strikes will be rare as a result. Migrating warblers may be struck at night, especially as they fly south in fall. Fortunately, these birds are very small and rarely cause damage.

24. Fringillids (sparrows, finches, grosbeaks, and buntings). Most fringillids are not hazardous to aircraft operations, but occasional large flocks can be encountered, particularly during migration. These birds are seed-eaters, as a rule, and most prefer weedy, brushy, or forested areas. Proper grass height management is the best means of control. Grass exceeding 14 inches will attract many of these birds and should not be allowed. Mowing should be accomplished before grass goes to seed. Pyrotechnics can be used to frighten many of these birds; success may be limited with others.

25. Mammals. While concern is mostly centered on birds, several mammalian species also pose threats to flight operations and must be considered. Close coordination with the INRMP is necessary to reduce this type of hazard.

    a. Deer. Members of the deer family (including moose, elk, and caribou) occasionally occur on airfields. These species are generally browsers, preferring broad-leaf weeds, shrubs, and trees. Do not allow growth of these plants on the airfield. The presence of these plants in surrounding areas will serve to draw these animals to the airfield. Tall fences (up to 15 feet) can discourage these animals from entering airfields, but due to expense, should only be used in urgent cases. On-base hunting will also discourage the presence of deer species, but deer populations should be eliminated in areas where they have direct access to runways and taxiways. Pyrotechnics should be used to frighten these animals when they do occur on the airfield.

b. Coyotes and Foxes. These animals are attracted to airfields by rodents, rabbits, and other food sources. Dens may be found in banks, culverts, or other suitable areas. Rodent control will reduce the numbers of these animals. Pyrotechnics can be used to frighten these species and occasional shooting of individual animals or recurrent pests will also reduce the hazard. Permits may be required.

c. Rabbits and Hares. In addition to direct hazards to aircraft, these animals often attract raptors. Proper grass management will reduce the number of these animals on airfield. Occasional extensive rabbit hunts on the field can reduce populations for several subsequent years. Poisoning can also be effective for reduction of populations. Permits may be required.

d. Rodents. These animals attract raptors. Control by maintaining a uniform turf at the proper heights. Rodenticides may be used in some cases.

Appendix D
Equipment

Appendix D. Bird/Wildlife Control Equipment

1. The following list provides a basic level of control equipment for NAS Oceana and NALF Fentress. The quantities of required equipment will vary over time depending on season and level of effort maintained. Cost estimates do not include shipping or other fees.

a. NAS Oceana

Item	Qty	Estimated Unit Cost	Extended Cost
Propane Cannon (M-8 Scareaway, rotomat base)	6	$575	$3,450
Propane Tanks	10	25	250
15 MM pyrotechnics launcher	6	30	180
12 Gauge Shotgun	2	300	600
12 Gauge Shot Tell (cracker shells)	10	100	1,000
15 mm Bangers/blanks	10	35	350
15 mm Screamer-siren	10	37	370
Protective Eye Guard	6	4	24
Ear Plugs	50	.50	25
Bioacoustics Player	1	250	250
ATV – 4 Wheel Drive	1	6,500	6,500
Total Estimated Cost			$12,999

b. NALF Fentress

Item	Qty	Estimated Unit Cost	Extended Cost
Propane Cannon (M-8 Scareaway, rotomat base)	3	$575	$1,725
Propane Tanks	5	25	125
15 MM pyrotechnics launcher	3	30	90
12 Gauge Shotgun	1	300	300
12 Gauge Shot Tell (cracker shells)	5	100	500
15 mm Bangers/blanks	50	35	175
15 mm Screamer-siren	5	37	185
Protective Eye Guard	3	4	12
Ear Plugs	25	.50	12.50
Bioacoustics Player	1	250	250
ATV – 4 Wheel Drive	1	6,500	6,500
Total Estimated Cost			$9,874.5

2. The following list includes vendors/sources for distress and alarm call tapes:

   a. Signal Education Aids
      2314 Broadway
      Denver, Colorado 80205
      (303) 295-0479

   b. Laboratory of Ornithology
      Cornell University
      159 Sapsucker Woods Rd.
      Ithica, New York 14850
      (607) 255-5056

   c. Borror Laboratory of Bioacoustics
      Arizona State University
      1735 Neil Avenue
      Columbus, Arizona 43210-1293
      (614) 292-2176

3. Below are listed vendors for pyrotechnic equipment.

   a. Reed-Joseph International Company
      232 Main Street
      PO Box 894
      Greenville, Mississippi 38702
      (800) 647-5554

   b. Margo Suppliers. Ltd.
      Site 20, Box 11, R.R. 6
      Calgary, Alberta T2M4L5
      (403) 285-9731

Appendix E
MBTA

DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

JAN 16 1997

MEMORANDUM FOR THE CHIEF OF NAVAL OPERATIONS (N45)
COMMANDANT OF THE MARINE CORPS (LFL)

Subj: MIGRATORY BIRD TREATY ACT; INTERIM ADVISORY

This memorandum provides interim advice regarding the applicability of the Migratory Bird Treaty Act (MBTA). The Navy recently faced this issue with regard to a potential incidental take of migratory birds in connection with a training exercise involving the bombardment of a Pacific island. The Fleet applied for a "special purpose" permit under the MBTA regulations, reasoning that an incidental take in connection with a training exercise would fall within the category of "other compelling justification" for a special purpose permit. The U.S. Fish and Wildlife Service (USFWS), however, refused to issue the special purpose permit, noting that such a permit does not cover incidental takes.

This office and the Office of the Assistant General Counsel (Installations and Environment) are working with the Office of the Secretary of Defense to develop policy guidance on the MBTA. Current guidance is not clear regarding incidental takes of migratory birds, although Navy and Marine Corps Activities routinely apply for depredation permits for actions to remove nuisance birds or their nests and for USFWS bird banding permits.

Development of a DoD-wide policy may take some time and could depend on, or change with, the outcome of a case, Sierra Club v. Martin, now on appeal before the United States Court of Appeals for the Eleventh Circuit. In that appeal and several recent district court cases, the Department of Justice (DOJ) has argued that federal agencies are not subject to the MBTA's procedural requirements for permits or its prohibitions on takes of migratory birds. Under this argument, federal agencies would not be required to obtain permits for incidental takes of migratory birds in connection with agency actions. DOJ has also argued that, even if a court were to find that the MBTA applies to federal actions, judicial review of such actions is not available.

Until DoD policy is available, we recommend that Navy and Marine Corps Activities be guided by DOJ's position in the Martin case with regard to incidental takes. This position is consistent with our own counsel's analysis of the law. Navy activities should continue to assess any potential, adverse impacts on migratory birds in the course of environmental planning with the goal of reducing those impacts to appropriate levels.

Elsie L. Munsell

ELSIE L. MUNSELL
Deputy Assistant Secretary of the Navy
(Environment and Safety)

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

5090
Ser N45D/7U595522
FEB 3 1997

From: Chief of Naval Operations

Subj: APPLICATION OF MIGRATORY BIRD TREATY ACT

Ref: (a) Migratory Bird Treaty Act, 16 U.S.C. §§703-712
(b) Migratory Bird Permits, 50 C.F.R. Part 21

Encl: (1) DASN (E&S) memo of 16 Jan 97

1. As a result of several recent court decisions involving federal actions concerning the unintentional taking of migratory birds, questions have arisen about the need to request permits under the Migratory Bird Treaty Act (MBTA), reference (a), and the U.S. Fish & Wildlife Service's (FWS's) implementing regulations, reference (b). Enclosure (1) advises that efforts are underway to develop DOD policy guidance on the MBTA and recommends that Navy and Marine Corps installations be guided by the Department of Justice's (DOJ's) litigative position in the most recent of these cases.

2. DOJ's litigative position is that neither federal agencies nor federal employees acting within the scope of their official duties are subject to the MBTA. Accordingly, until DOD policy guidance is forthcoming, Navy commands and installations shall neither request nor apply for "special purpose" permits from the FWS when planning for or engaging in activities that could result in the unintended "taking" of migratory birds. Installations planning or engaging in the intentional "taking" of migratory birds, e.g., control of depredating birds, scientific collection, taxidermy, or bird banding, should continue to follow normal MBTA permit requirements.

3. Regardless of whether a permit is required, Navy installations and commands should continue to strive to reduce adverse impacts on migratory birds in the course of planning for and engaging in activities.

Subj: APPLICATION OF MIGRATORY BIRD TREAT ACT

4. My point of contact for this matter is Mr. Thomas Egeland, N45D, (703) 428-0437, DSN 328-0437, Internet address: taegeland@hq.navfac.navy.mil.

J. W. TAYLOR
By director

Distribution:
(See next page)

PET navy guidance

United States Department of Agriculture

Animal and Plant Health Inspection Service

Subject: Migratory Bird Permitting Guidelines

Date: April 25, 1997

To: See DISTRIBUTION

Legal actions involving the Migratory Bird Treaty Act (MBTA) permitting procedures have resulted in a Department of Justice litigation position that Federal agencies are not subject to the MBTA's procedural requirements for permits. This has been interpreted by the Department of the Interior Solicitor's Office to mean that the Fish and Wildlife Service (Service) is no longer authorized to issue permits to Federal agencies for the take of migratory birds. The Service has been aware of this action for several months, and ADC has been anticipating policy guidance from the Service, defining and describing the implementation of this action. Unfortunately, this guidance has not been forthcoming; therefore, it is incumbent on ADC to establish internal guidelines to address this new migratory bird "permitting" procedure.

The court actions involving the Justice Department position are under appeal, and it is conceivable that this ruling could be reversed or altered. In addition, the Service is currently working to develop an Executive Order that will address this issue and is expected to provide information and guidance. It is our understanding that APHIS/ADC, along with other Federal agencies, will have an opportunity to review this document and provide comments. It is unclear the timeframe in which this will occur. In the meantime, ADC should continue to carry out its management responsibilities in a professional manner by implementing biologically sound, wildlife damage management actions.

Pending the development of an Executive Order, ADC will be guided by the current Department of Justice litigation position. ADC will administer its migratory bird damage management programs using the following general guidance:

1. Permitted Activities - Conduct business as usual under existing permits already issued by the Service.

2. Non-Permitted Activities - ADC actions not authorized under existing Service permits are to be carefully reviewed to ensure professional soundness. Inform the Service of the proposed action. Forms will be provided by your regional office to document the contact. Based on the Justice Department ruling, approval by the Service is not required.

3. Environmental Considerations - Assess the proposed action and prepare the appropriate NEPA document to cover your activities. Use existing regional forms to document your actions.

MAY

4. State Laws - Continue to adhere to State laws and regulations. The Justice Department ruling does not apply to permits issued to ADC by State agencies.

5. Endangered Species - The Justice Department ruling does not affect permitting procedures related to endangered species. Service consultation under the Endangered Species Act may still be required. Regional forms will provide language for a "no effect" determination.

6. Bald and Golden Eagles - The status of bald and golden eagle permits is still unclear. Until a definitive policy determination is made by the Service, you are advised to contact the appropriate Service regional office for specific guidance on a case-by-case basis.

Additional guidance will be provided by your regional offices/NWRC Director. Headquarters will monitor the legal proceedings relating to migratory bird permitting activity and keep you informed. Questions regarding this issue can be directed to Pete Poulos at Area Code (301) 734-7921.

Bobby R. Acord
Deputy Administrator
Animal Damage Control

DISTRIBUTION:
Gary Larson, Regional Director, Nashville, TN
Mike Worthen, Regional Director, Lakewood, CO
Dick Curnow, Director, NWRC, Fort Collins, CO
State Directors

Subj: APPLICATION OF MIGRATORY BIRD TREAT ACT

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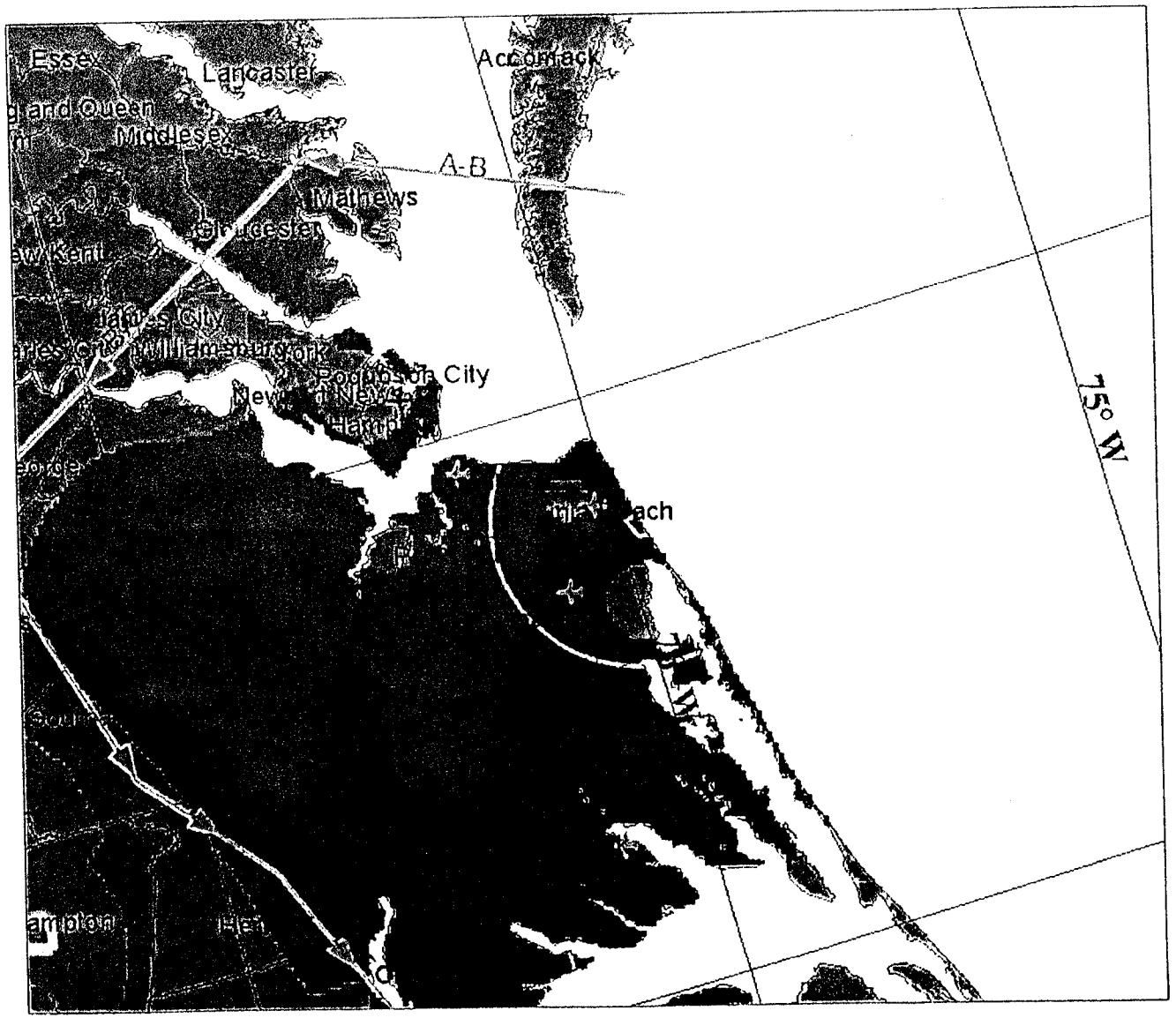
CO ENGFLDACT WEST
CO ENGFLDACT CHES
CO ENGFLDACT NORTHWEST
CO PWC GREAT LAKES
CO PWC GUAM
CO PWC JACKSONVILLE
CO PWC NORFOLK
CO PWC PEARL HARBOR

Appendix F
BAM Maps

Bird Strike Hazard for December 17 - 31 Day

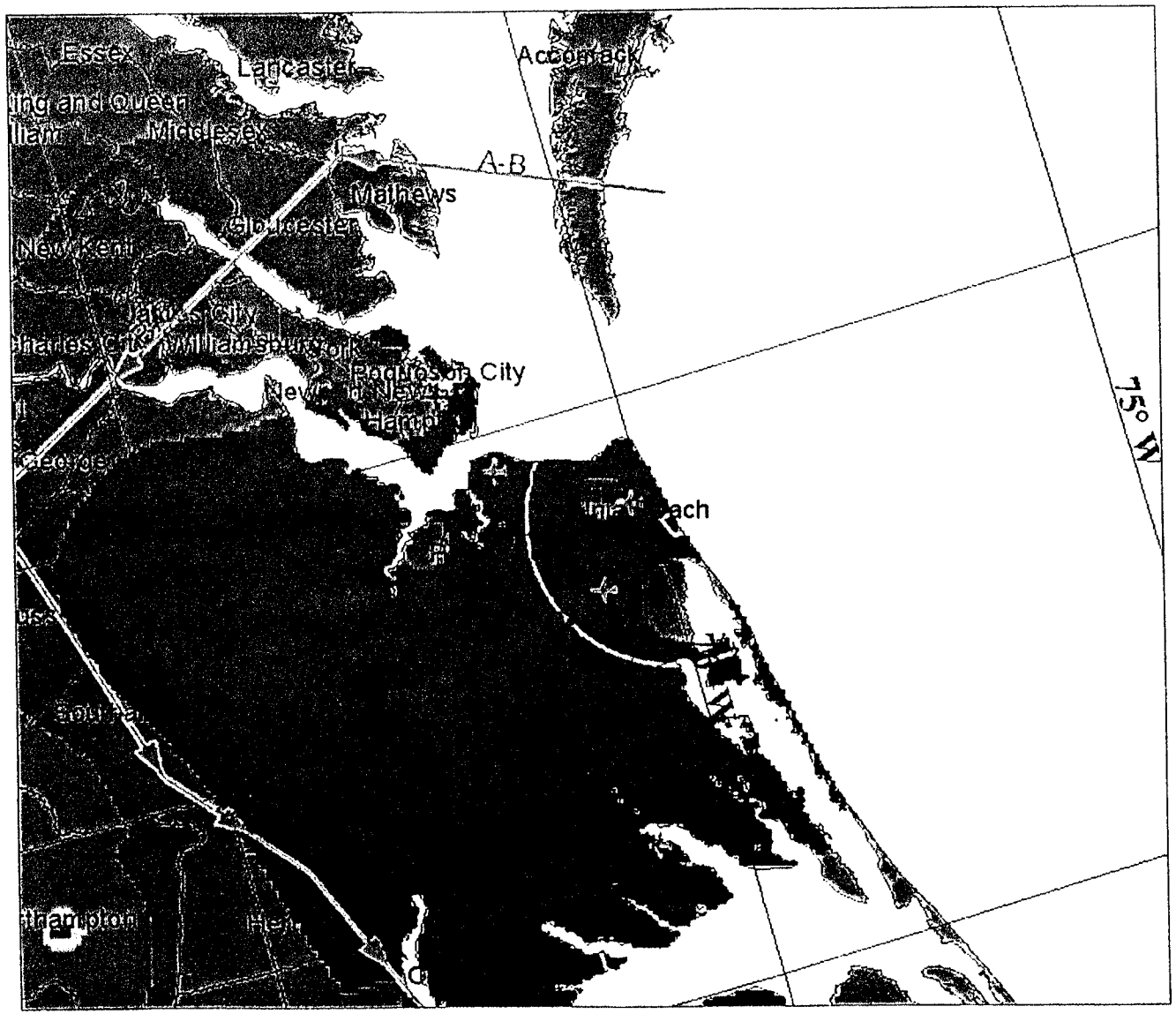


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

December 17 - 31
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for December 3 - 16 Day

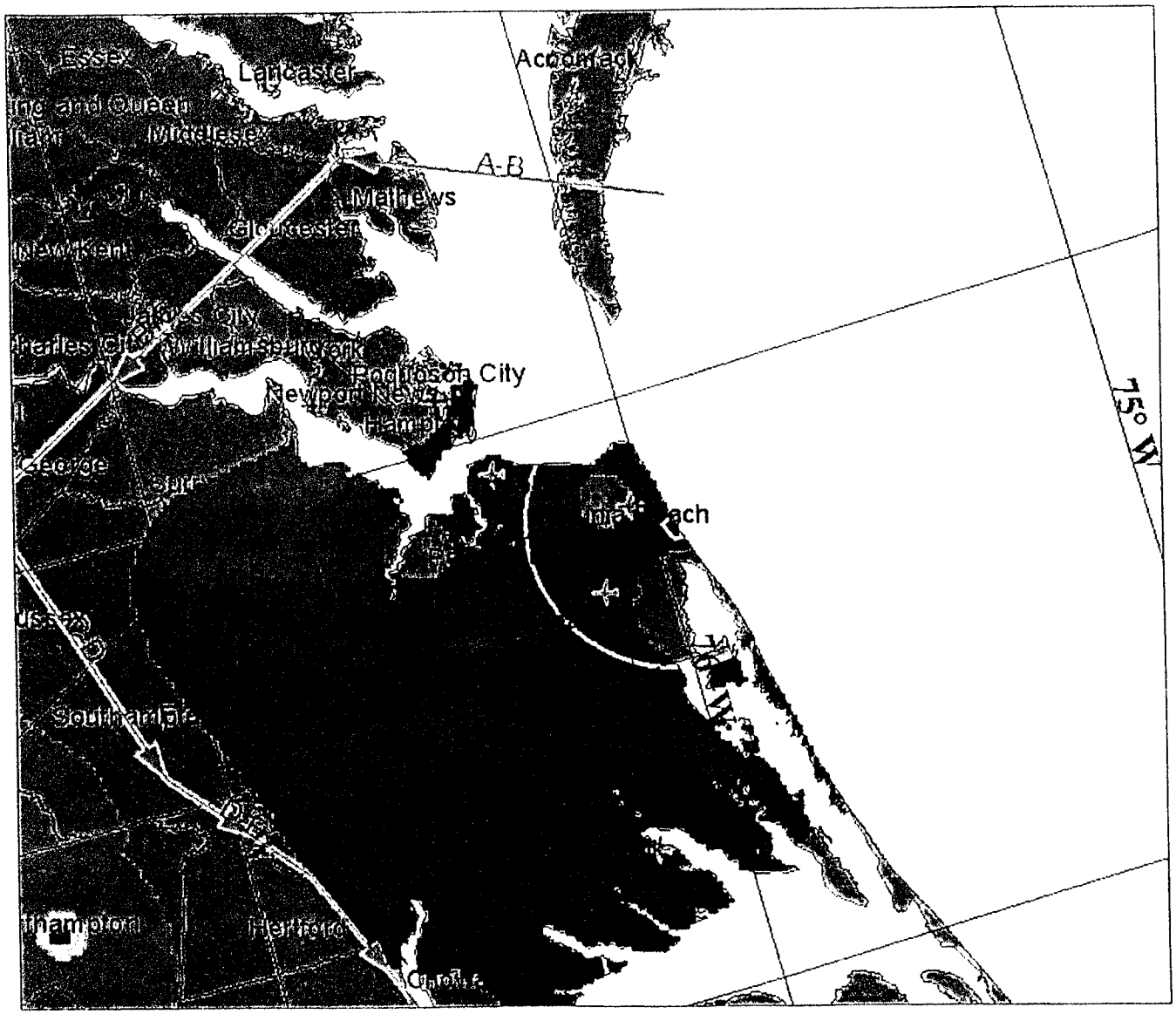


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

December 3 - 16
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for November 19 - December 2 Day



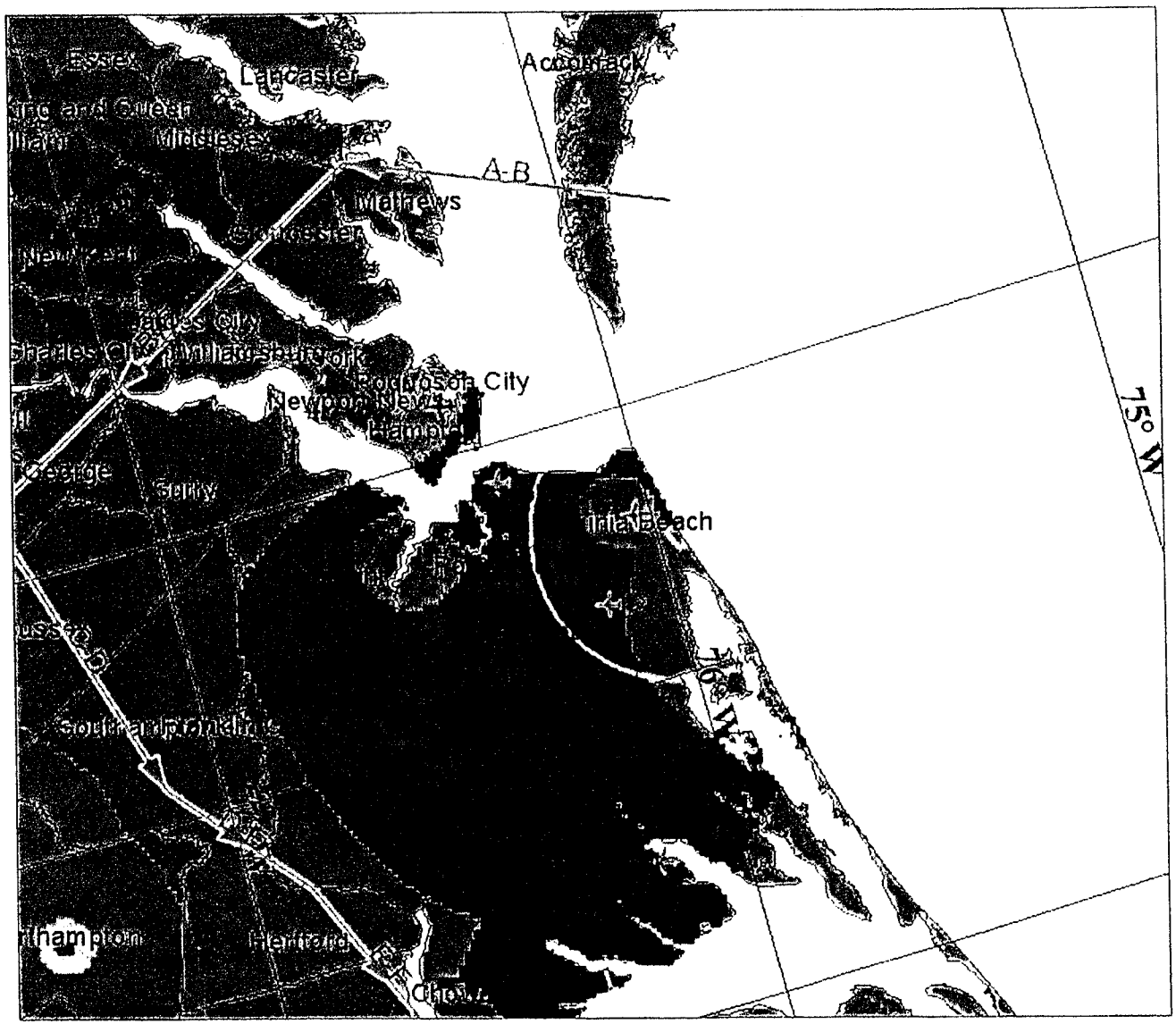
State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

November 19 - December 2
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

0 9 18 Nautical Miles

Bird Strike Hazard for November 5 - 18 Day

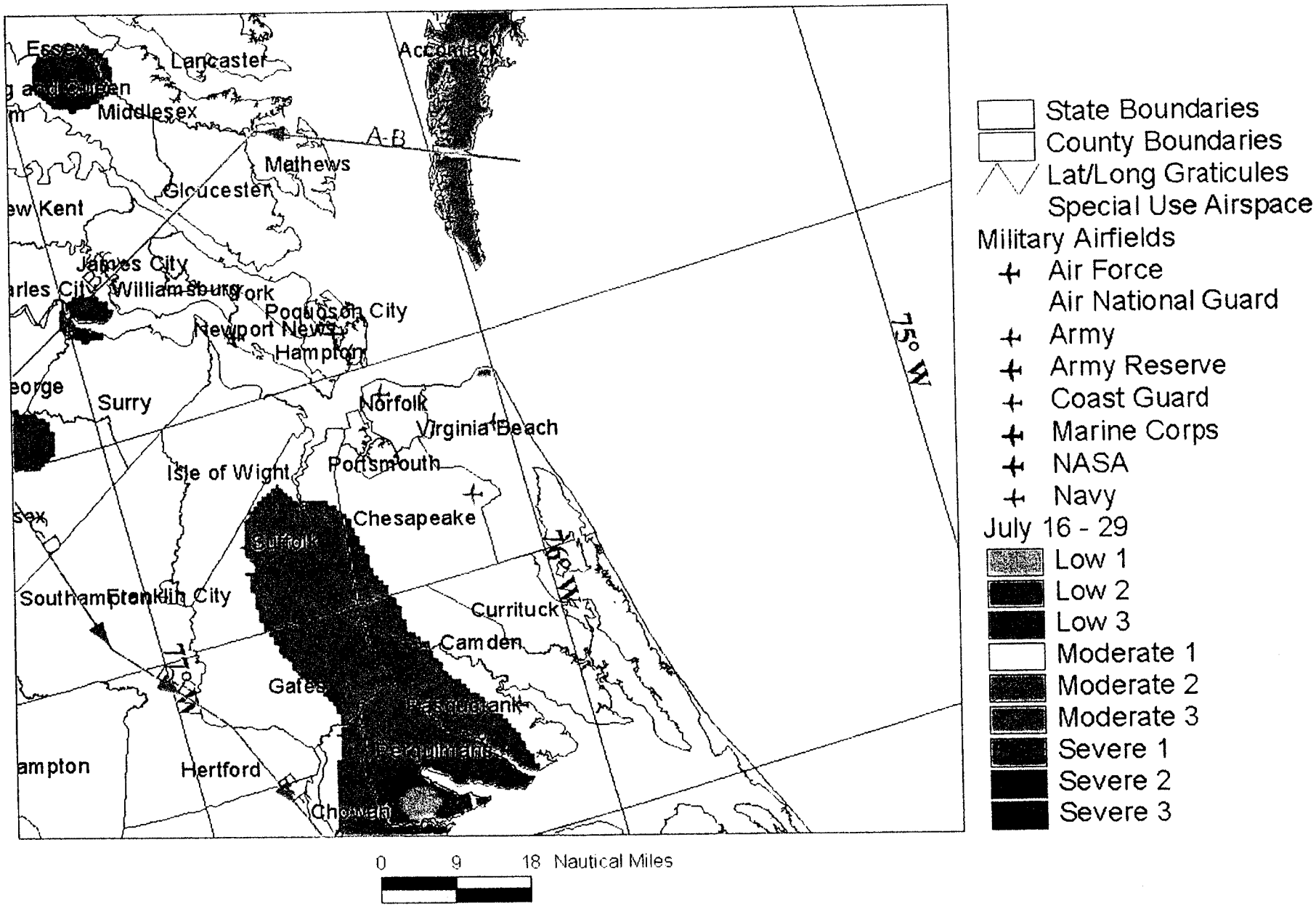


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

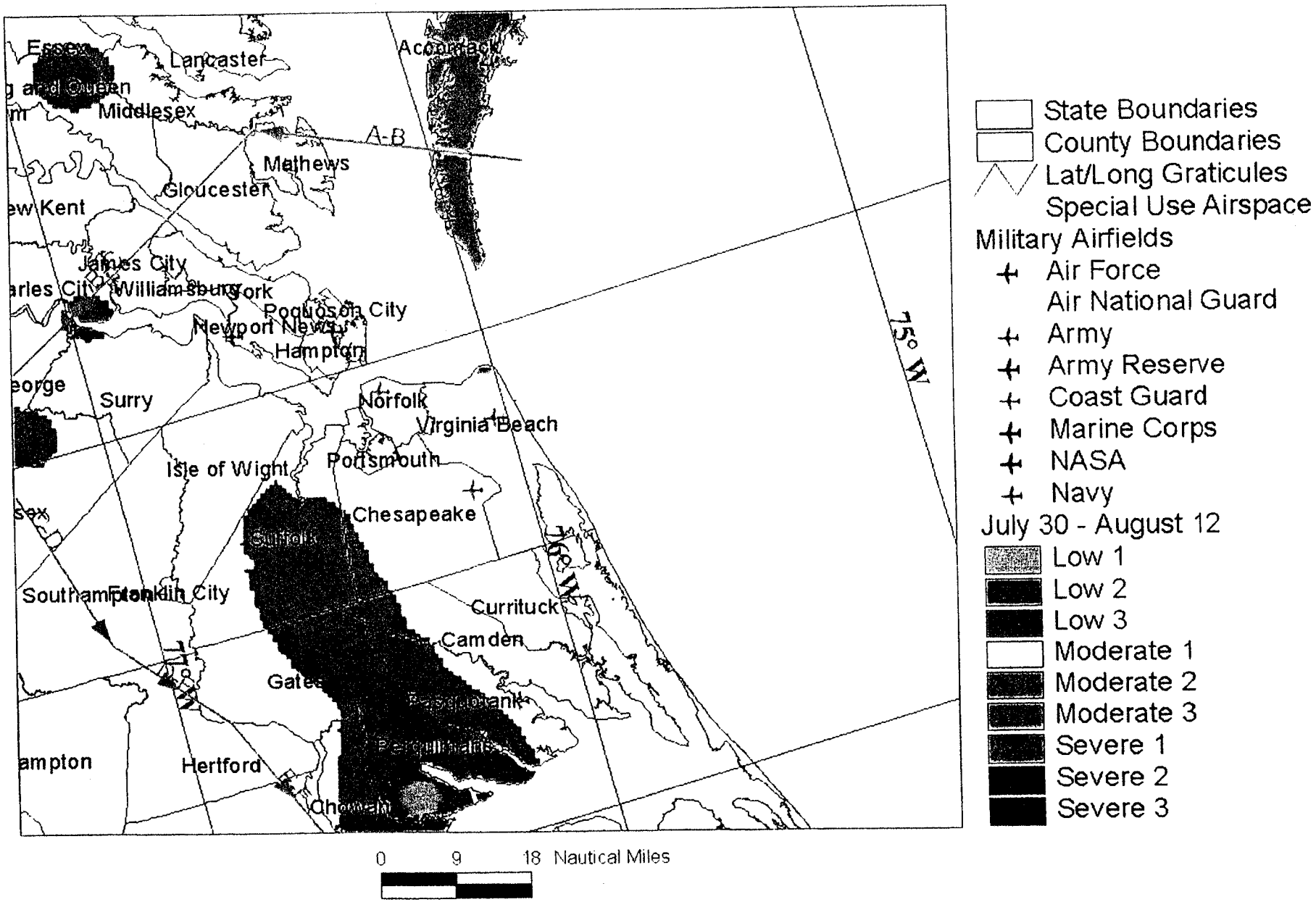
Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

November 5 - 18
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

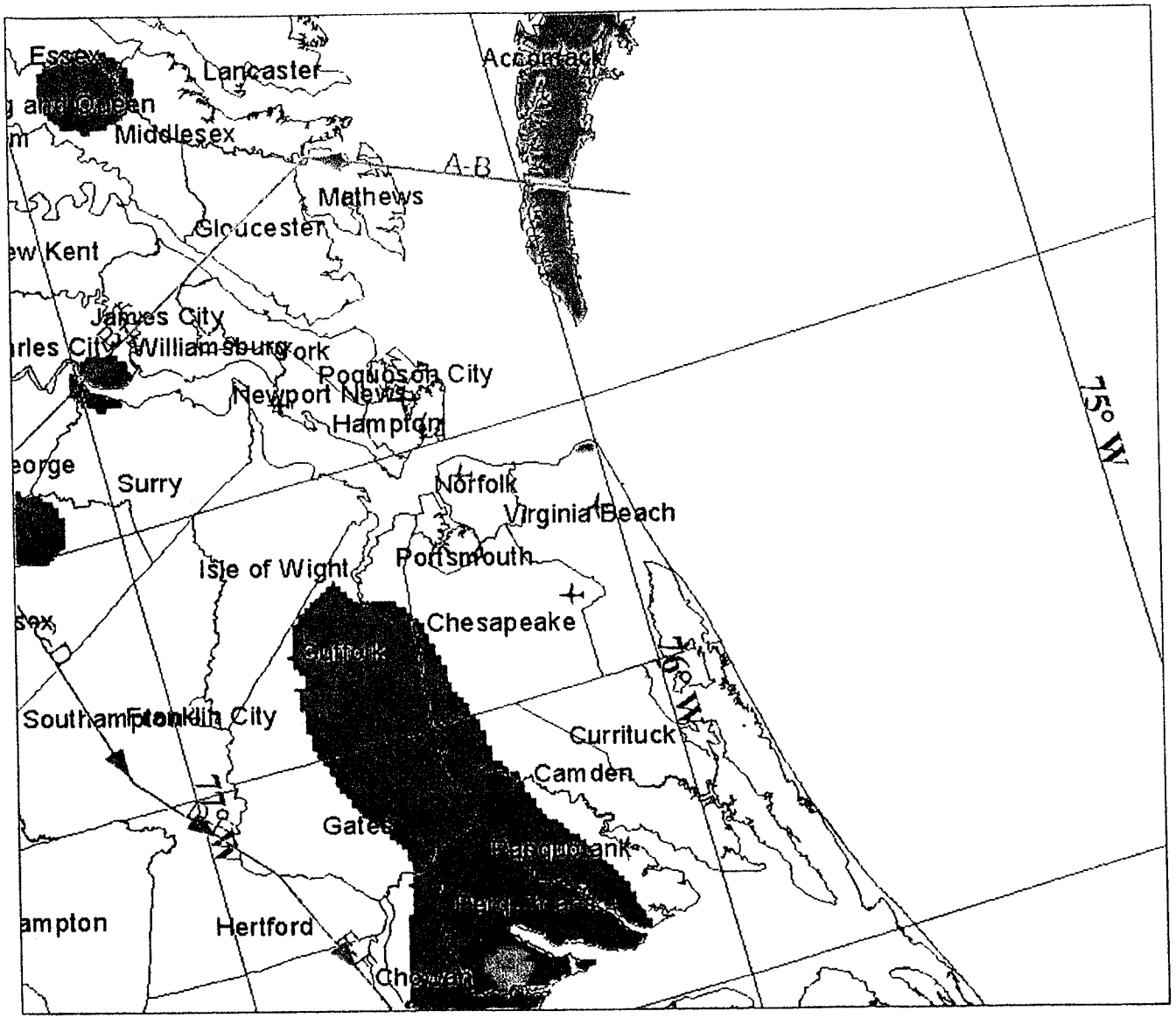
Bird Strike Hazard for July 16 - 29 Day



Bird Strike Hazard for July 30 - August 12 Day



Bird Strike Hazard for June 18 - July 1 Day



- State Boundaries
- County Boundaries
- Lat/Long Graticules
- Special Use Airspace

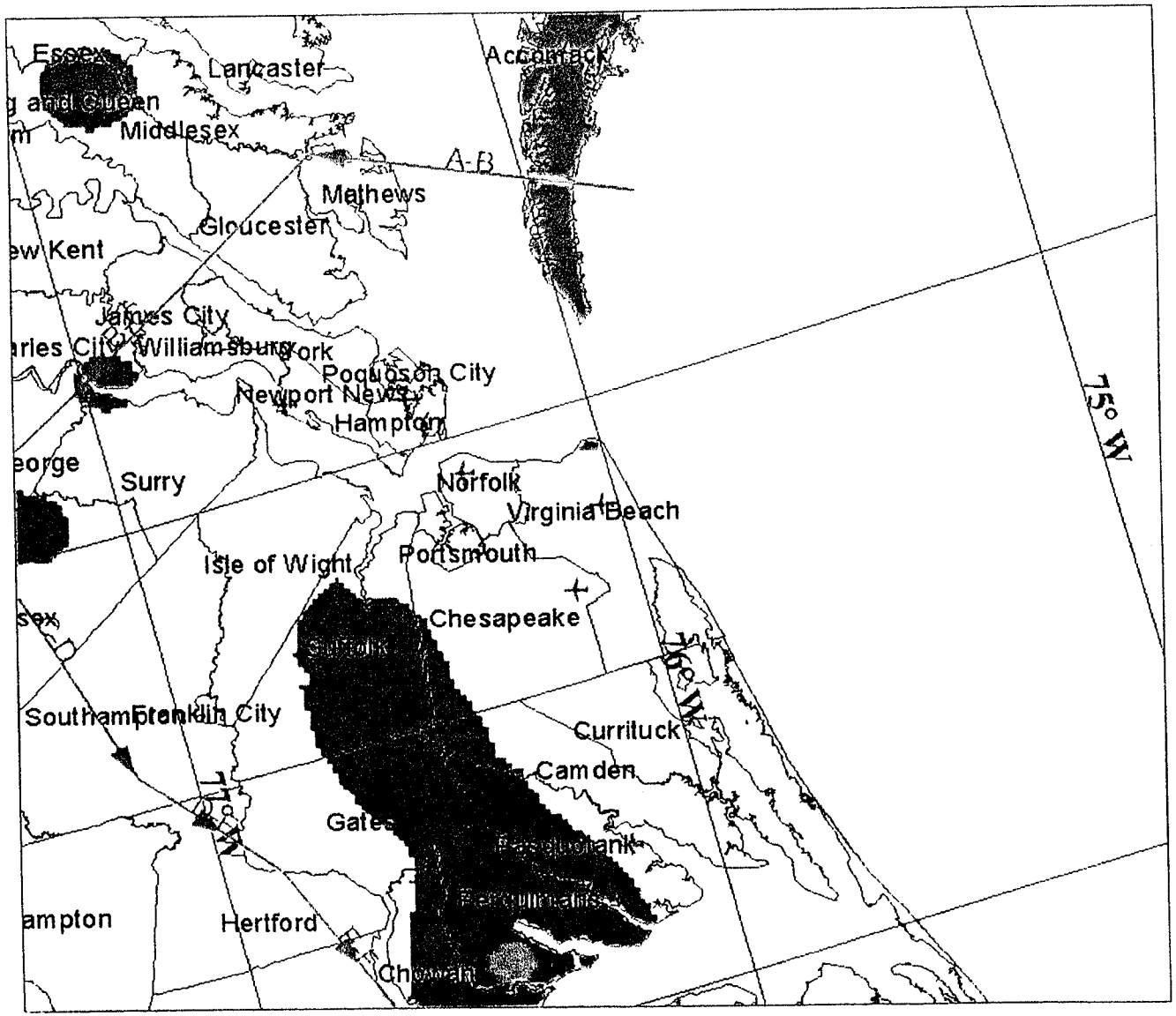
Military Airfields

- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

June 18 - July 1

- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for July 2 - 15 Day

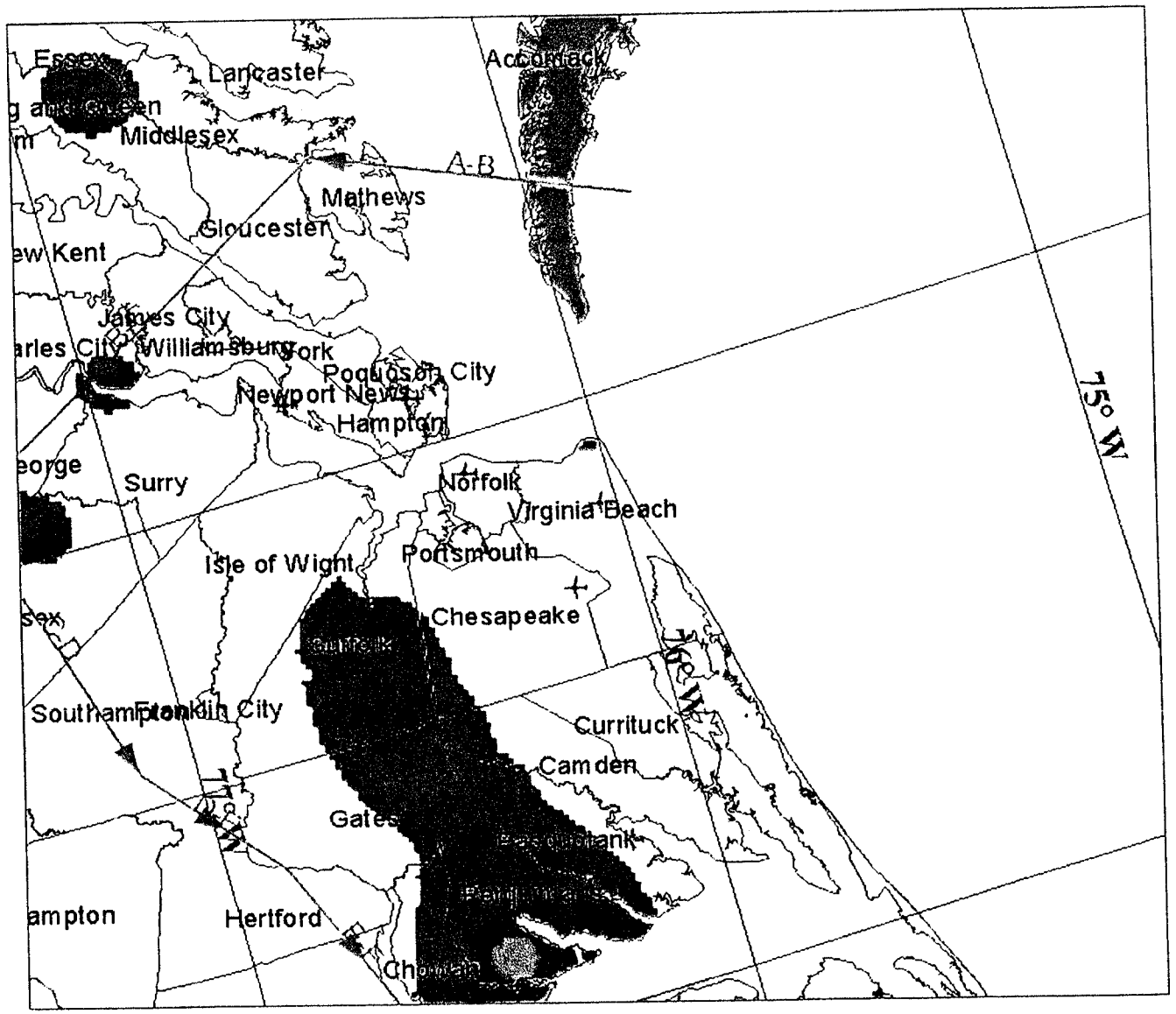


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

July 2 - 15
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for May 21 - June 3 Day



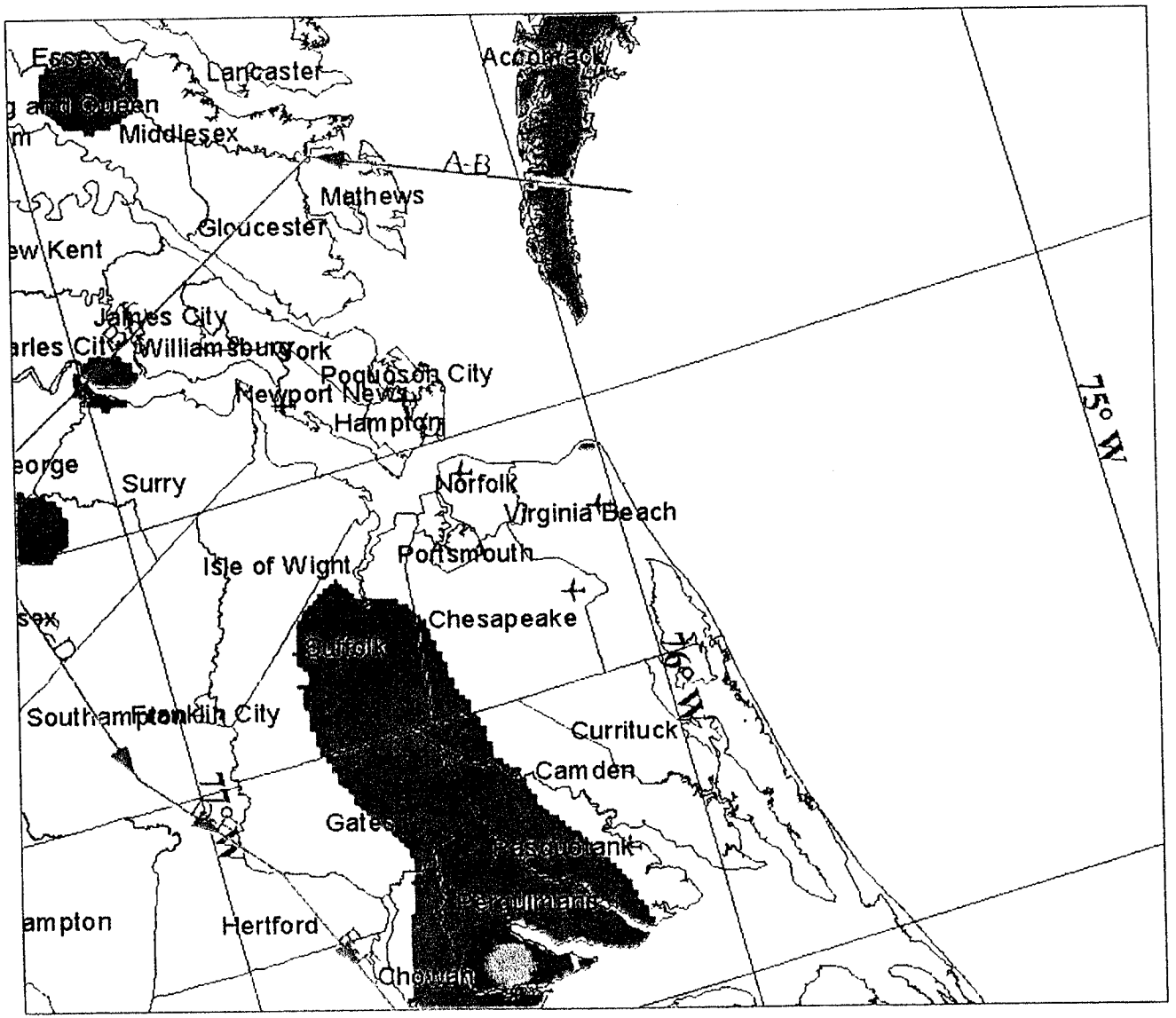
0 9 18 Nautical Miles

State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

May 21 - June 3
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for June 4 - 17 Day

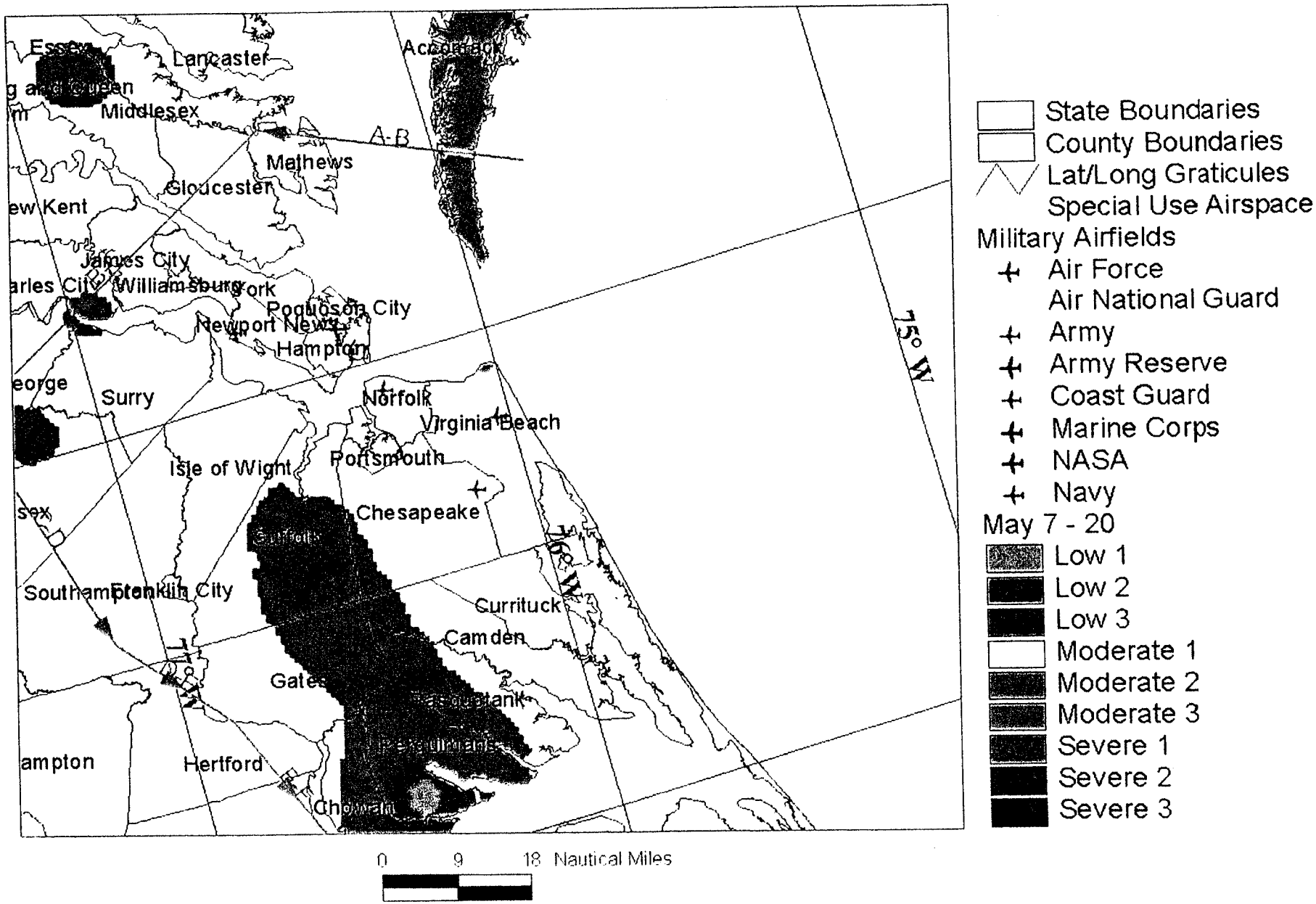


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

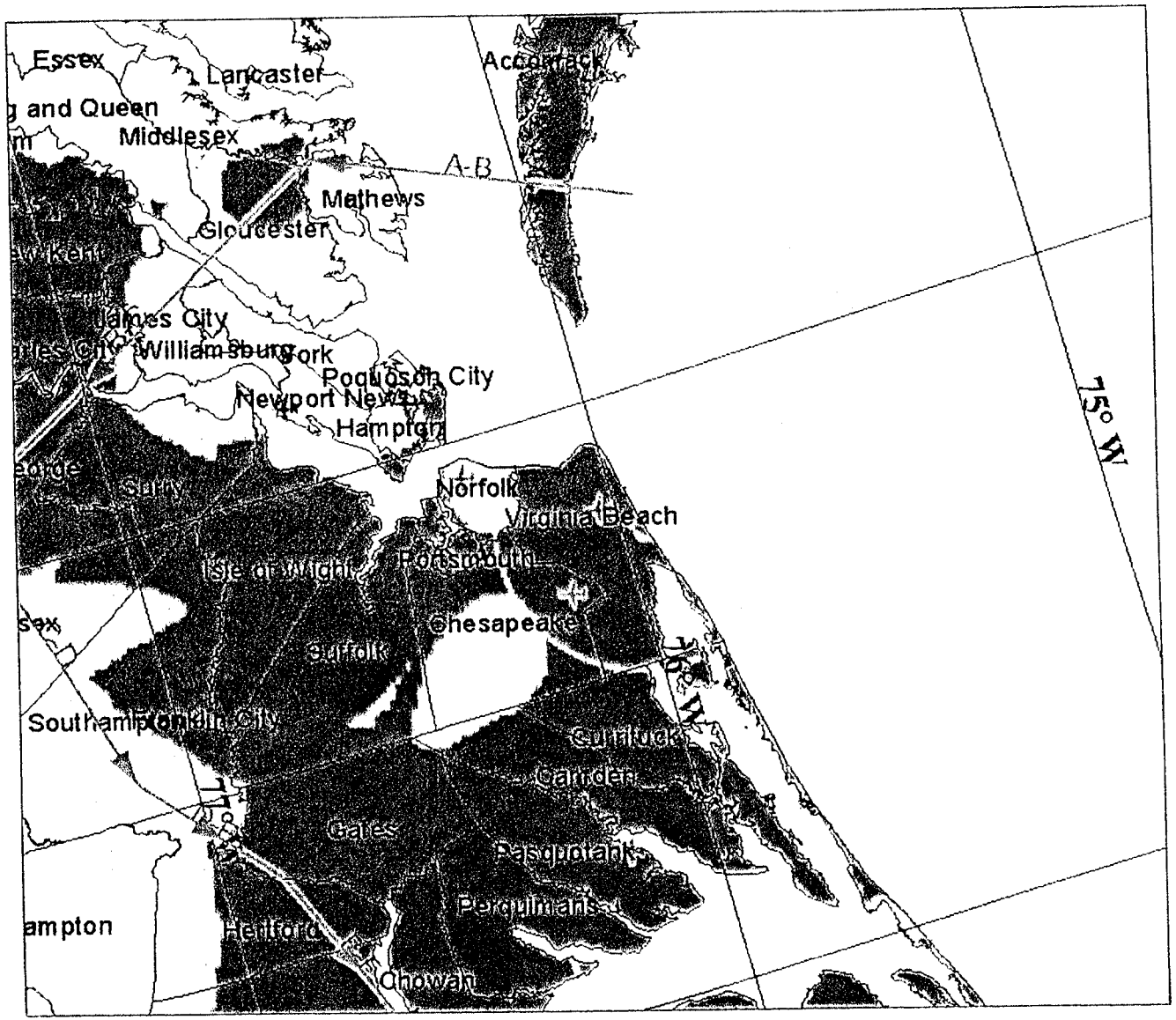
Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

June 4 - 17
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for May 7 - 20 Day



Bird Strike Hazard for April 23 - May 6 Day

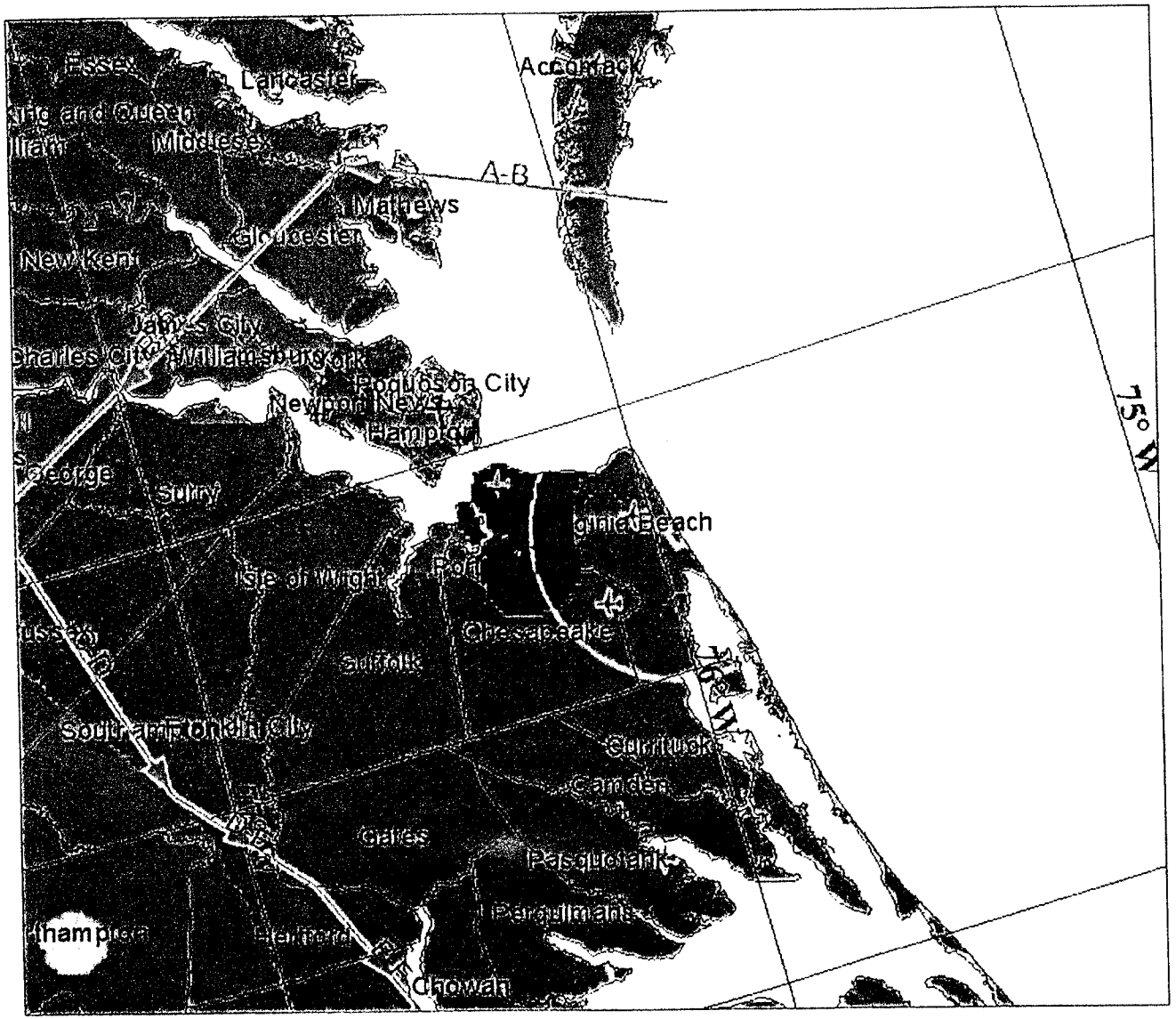


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

April 23 - May 6
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for March 26 - April 8 Day



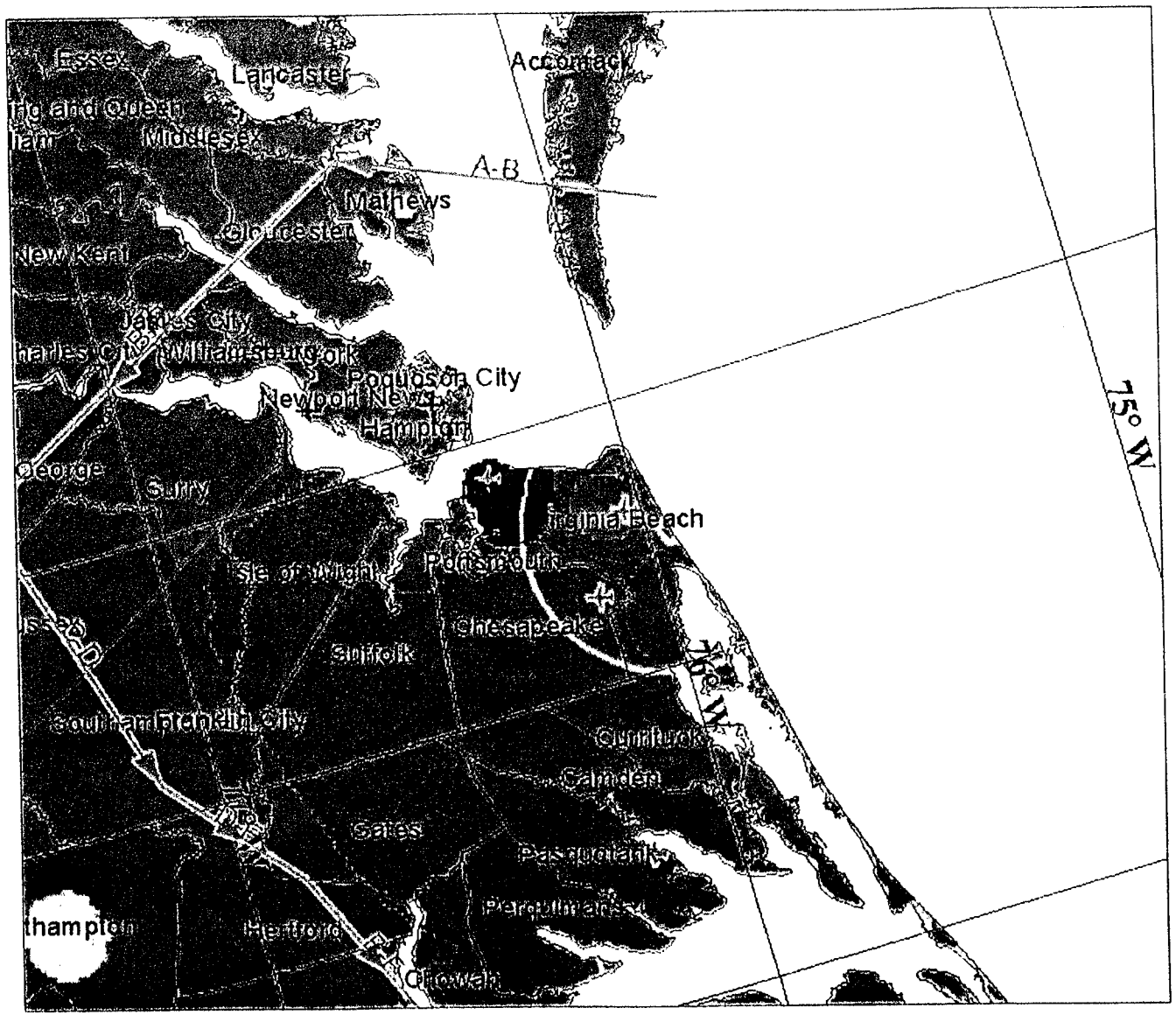
0 9 18 Nautical Miles

State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

March 26 - April 8
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for April 9 - 22 Day

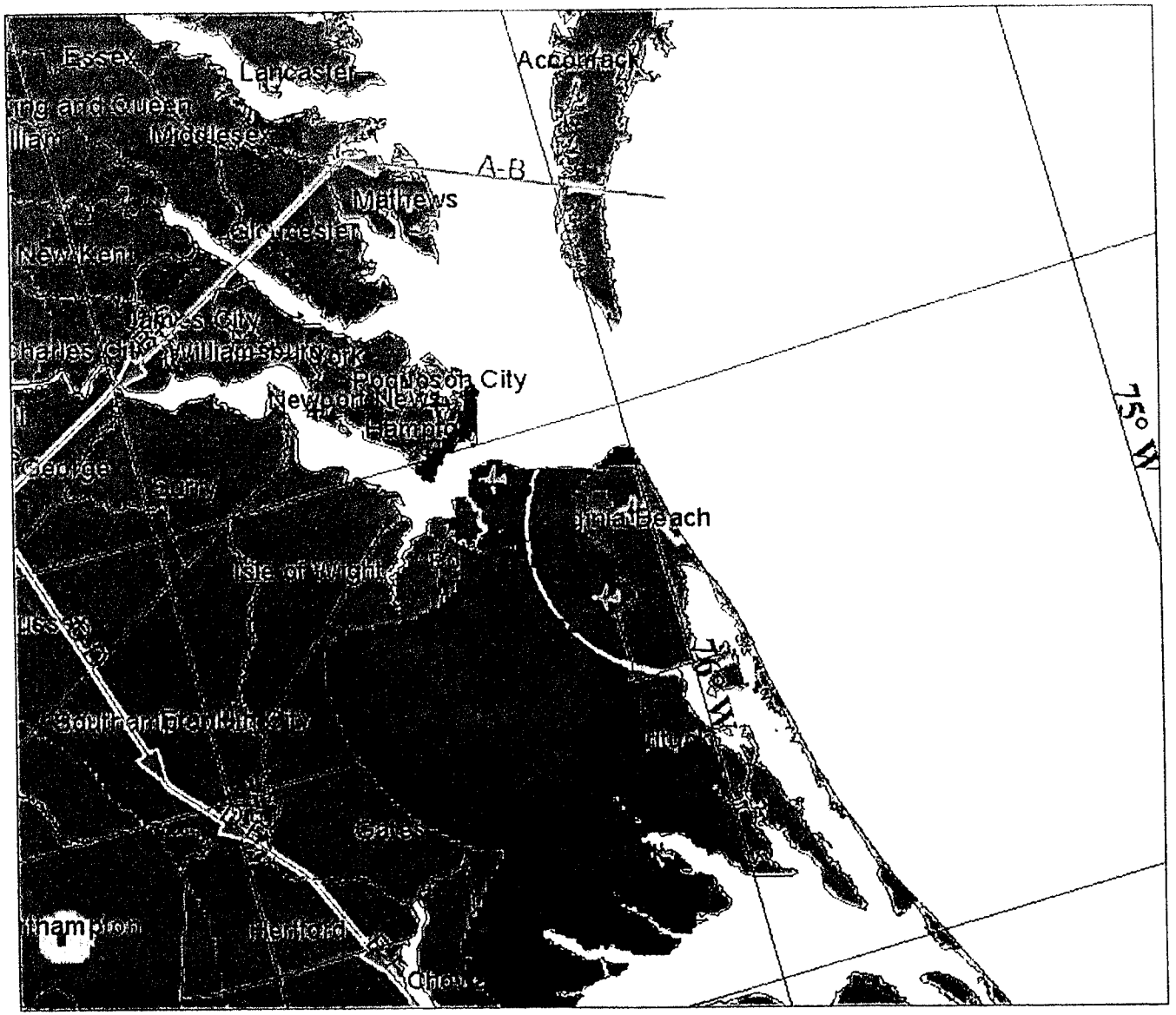


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

April 9 - 22
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for March 12 - 25 Day



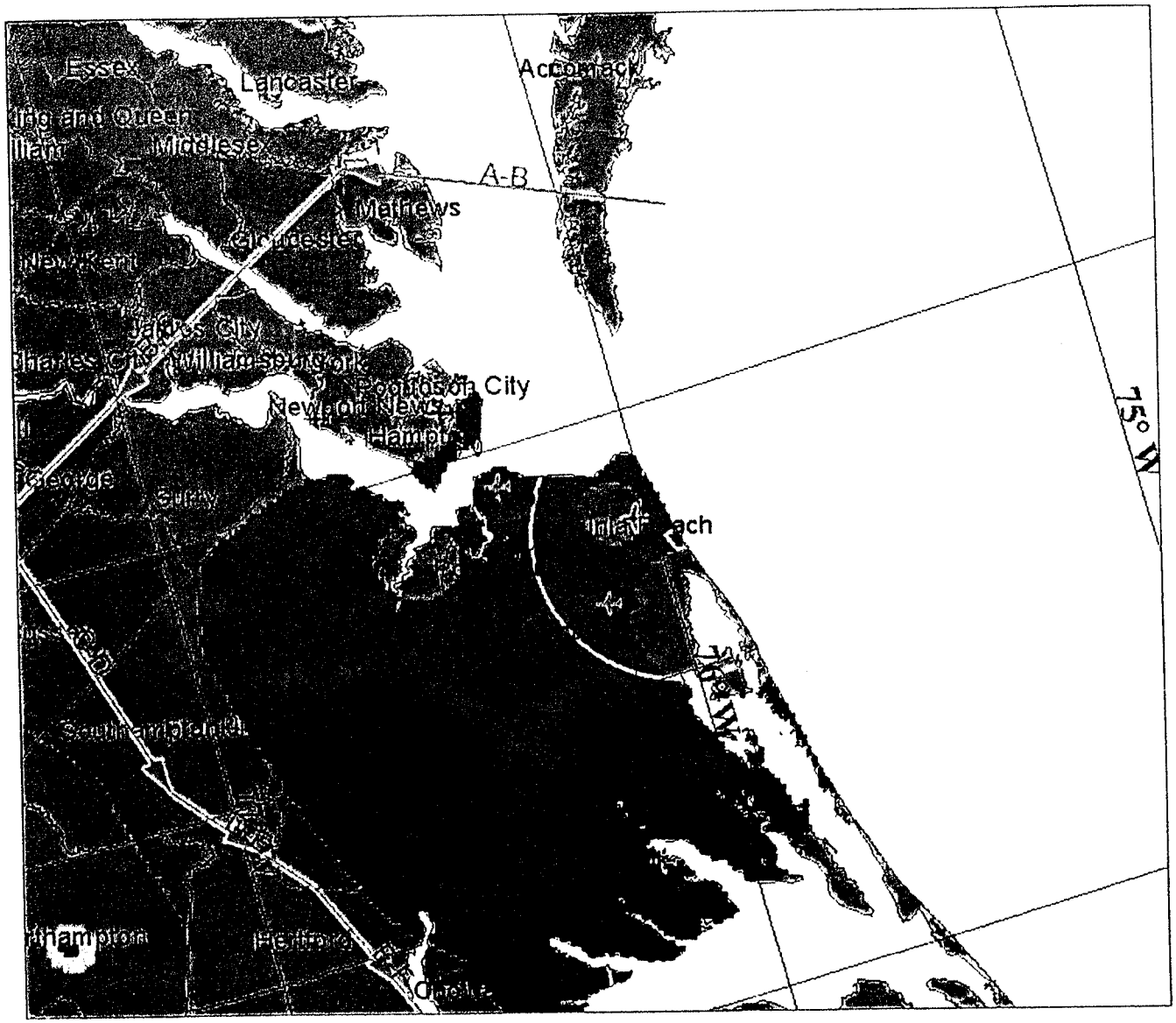
0 9 18 Nautical Miles

State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

March 12 - 25
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for February 26 - March 11 Day



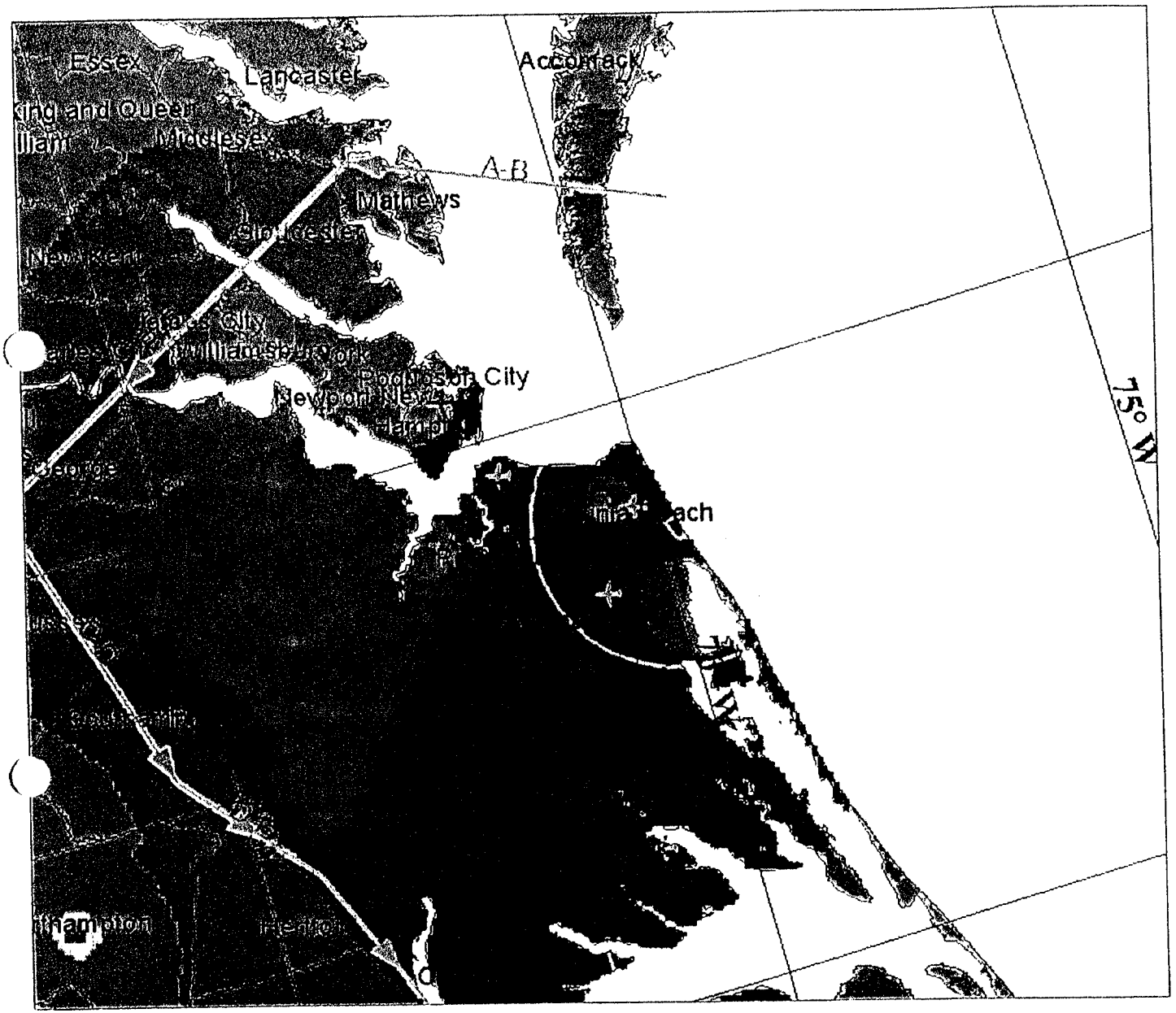
0 9 18 Nautical Miles

State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

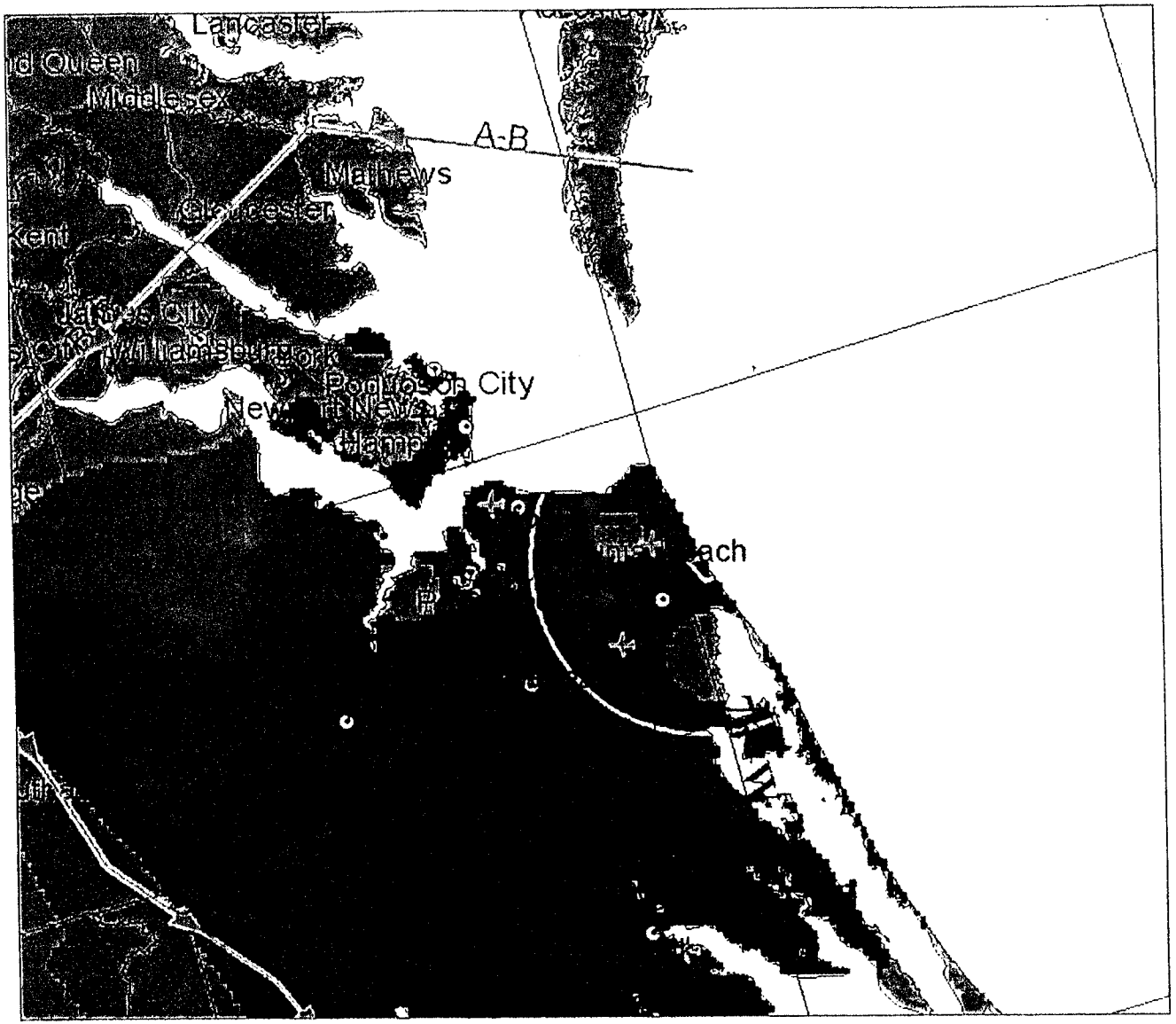
February 26 - March 11
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for Februa 12 - 25 Day



State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace
Military Airfields
Air Force
Air National Guard
Army
Army Reserve
Coast Guard
Marine Corps
NASA
Navy
February 12 - 25
Low 1
Low 2
Low 3
Moderate 1
Moderate 2
Moderate 3
Severe 1
Severe 2
Severe 3

Bird Strike Hazard for Route VR1753 January 1 - 14 Day

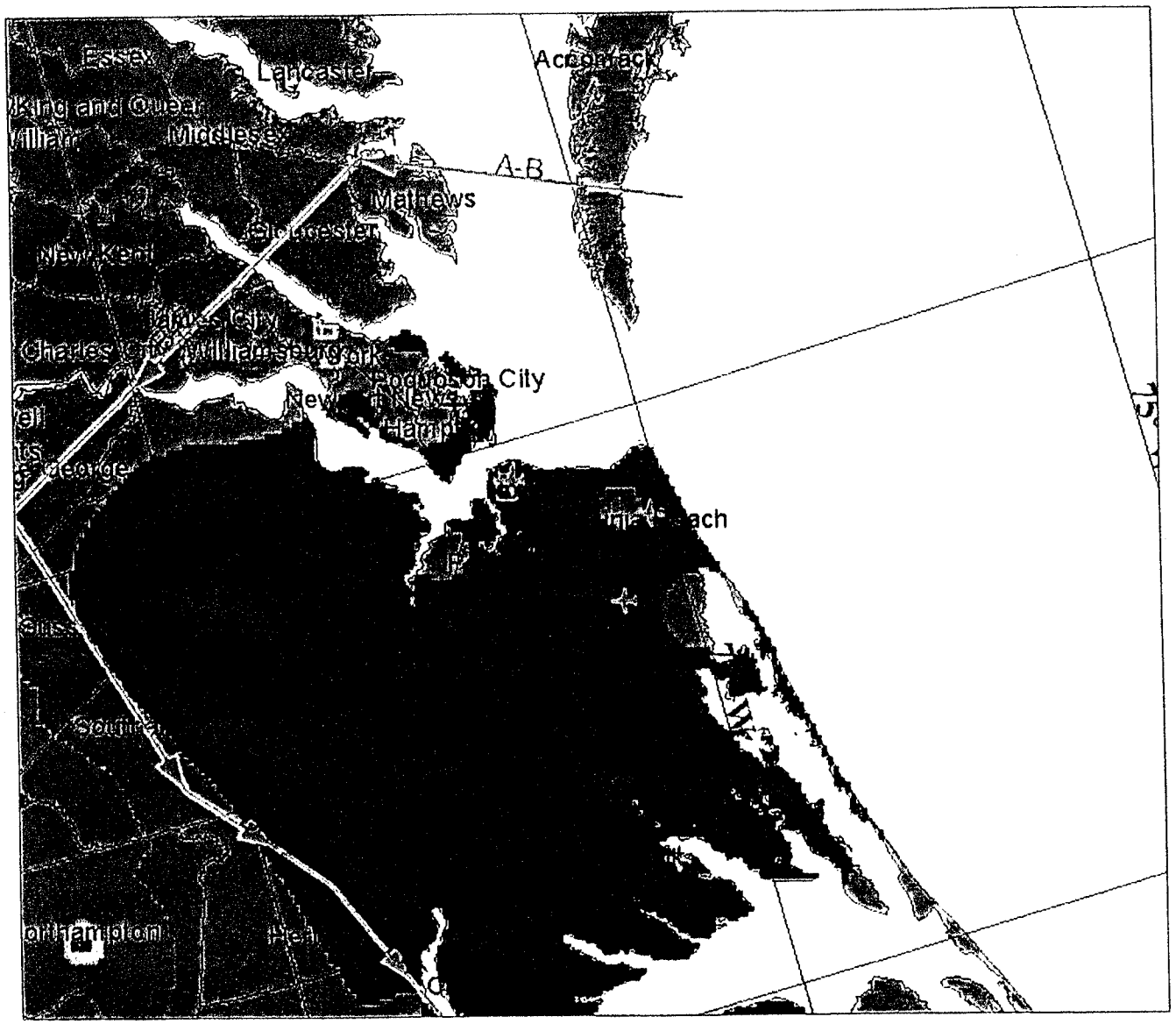


State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy
- Major Cities

January 1 - 14
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for January 29 - February 11 Day



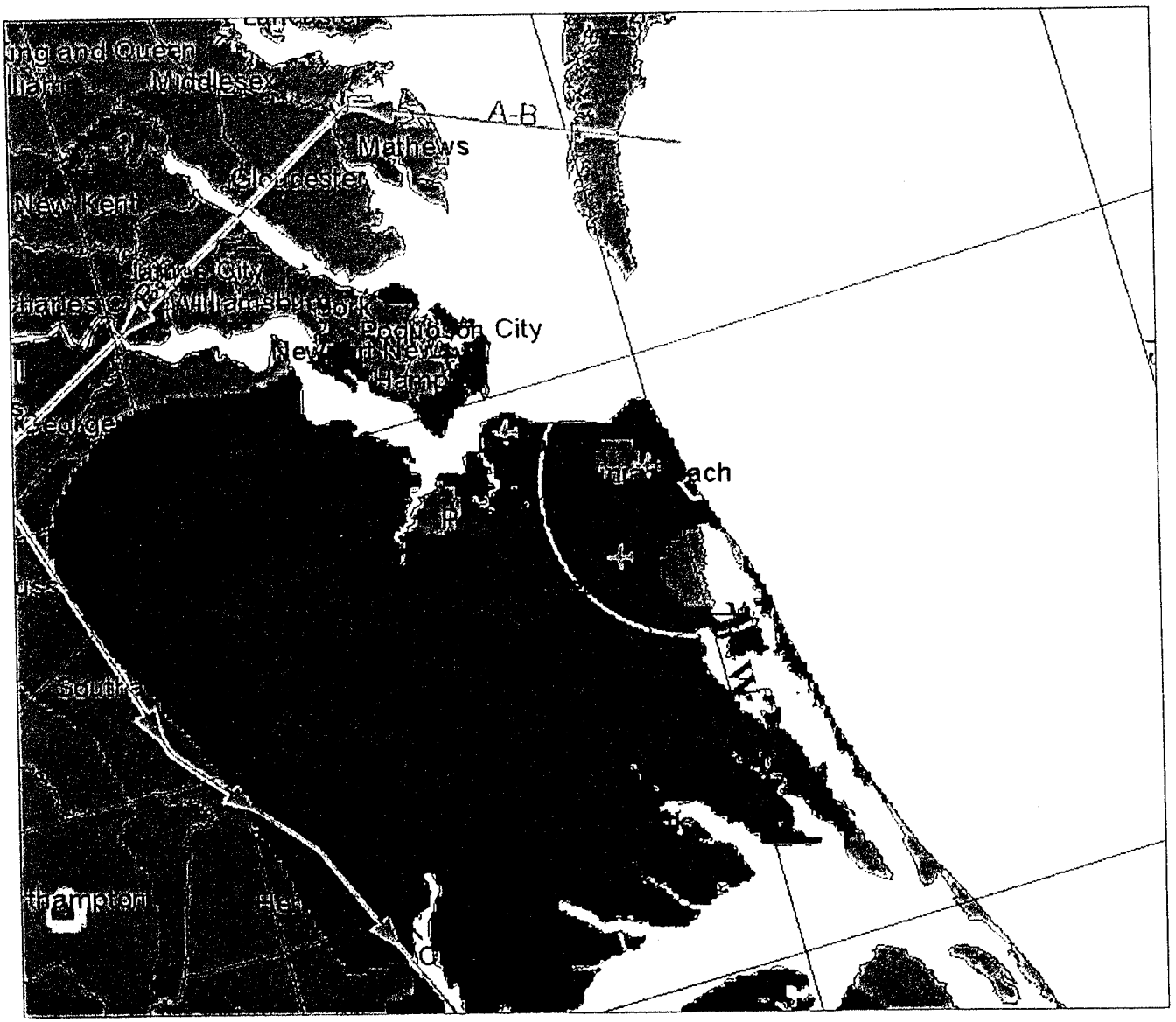
State Boundaries
County Boundaries
Lat/Long Graticules

Military Heliports
- Air Force
- Army
- Army National Guard
- Coast Guard
- Marine Corps
- Navy

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

January 29 - February 11
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Bird Strike Hazard for January 15 - 28 Day



0 8 16 Nautical Miles

State Boundaries
County Boundaries
Lat/Long Graticules
Special Use Airspace

Military Airfields
- Air Force
- Air National Guard
- Army
- Army Reserve
- Coast Guard
- Marine Corps
- NASA
- Navy

January 15 - 28
- Low 1
- Low 2
- Low 3
- Moderate 1
- Moderate 2
- Moderate 3
- Severe 1
- Severe 2
- Severe 3

Appendix G
References

Appendix G. General BASH References

1. **General.** This appendix includes sources of information and points of contact for BASH related issues.

2. **Technical Points of Contact:** The following are available to discuss specific bird and wildlife hazard issues:

a. Air Operations Branch

LtCmdr Jimmy McLauglin
Code 114
Naval Safety Center
375 A Street
Norfolk, Virginia 23511-4399
Com (747) 444-3520 Ext 7281
DSN 564-3520 Ext 7281
Jmclaugh@safecen.navy.mil

b. USAF BASH Team

AFSC/SEFW
Mr. Eugene LeBoeuf
9700 Ave G., SE, Suite 279A
Kirtland AFB, NM 87117
DSN 246-5679
(505) 846-5679
LEBOEUFE@SMTPS.SAIA.AF.MIL

c. FAA

FAA – Airports
Mr. Edward Cleary
800 Independence Ave, SW, Rm 615
Washington D.C. 20591
(202) 267-3389
ED_CLEARY@MAIL.FAA.HQ.GOV

d. Consultants

Geo-Marine, Inc.
Ron Merritt
3160 Airport Road, Suite 22-A
Panama City, Florida 32405
(850) 913-8003
(850) 913-9582
BASHMAN@AOL.COM

3. **Web Sites with BASH Information.**

HQ AFSC
http//www.afsc.saia.af.mil/afsc/bash/home.html

AF Pubs
http//www.afpubs.hq.af.mil/elec-products/

Todd Curtis
http//www.airsafe.com/birds.html

Sandusky
http//www.lrbcg.com/nwrcsandusky

BSC USA
http//www.lrbcg.com/nwrcsandusky/bscusa.html

USDA/APHIS
http//www.aphis.usda.gov

AFCESA
http//www.afcesa.af.mil

AMC Flight safety
http//www.safb.af.mil/docs/bash/html/bashtocnf.html

FAA Circs
http//www.faa.gov/arp/arphome.html

Low-level Hazard Advisories (East Coast Region)
http//www.ahas.com

4. **Literature**. The following references provide an excellent text reference for bird/wildlife hazards.

a. Blokpoel, H. 1976. Bird hazards to aircraft. Clarke, Irwin and Co. Ltd., Toronto. 236 p.

b. Brough, T. 1968. Recent developments in bird scare on airfields. pp. 29-38. In R.K. Murton and E.N. Wirht (eds.). The Problems of Birds as Pests. Institute of Biology Symposium No. 17, Academic Press, New York. 245 p.

c. Brough, T., and C.J. Bridgman. 1980. An evaluation of long grass as a bird deterrent on British airfields. J. Appl. Biol. 17:243-253.

d. Bruun, B. B., C.S. Robbins and H. Zim. 1983. Birds of North America. Golden Press, New York.

e. Jarman, P. 1993. A manual of airfield bird control. British Crown Copyright 1992/DRA. United Kingdom. 143p.

5. **Related Scientific and Professional Meetings.**

a. Bird Strike Committee - USA (BSCUSA)
This organization was formed in 1991 as a joint effort by the FAA, USAF, and USDA, to facilitate the exchange of information, promote the collection and analysis of accurate wildlife strike data, promote the development of new technologies for reducing wildlife hazards, promote professionalism in wildlife management programs on airports through training and advocacy of high standards of conduct for airport biologists and bird patrol personnel, and be a liaison to similar organizations in other countries. The organization is directed by an 8-person steering committee consisting of two members each from the FAA, USDA, Department of Defense, and the aviation industry Wildlife Hazards Working Group. Bird Strike Committee - USA meets annually. For more information please call: (419) 625-0242.

b. Bird Strike Committee - Canada (BSCC)
This organization is sponsored by Transport Canada and the Department of National Defense and is aimed at providing a mechanism for discussion of matters relating to bird hazard awareness and wildlife control at Canadian airports. The organization includes membership from various government departments including: Agriculture Canada, Canadian Museum of Nature, and Canadian Wildlife Service. Associate members include representatives from all major Canadian airlines, aviation industry members and associations, and others. BSCC meets twice each year. For additional information please call: (613) 990-1402.

c. Bird Strike Committee - International
This long standing committee, formerly Bird Strike Committee - Europe, is an international forum for the discussion of all topics relating to bird and wildlife hazards to aviation. Meetings are held every two years and include working groups on Aerodrome Bird Hazards, Radar and Remote Sensing, Aircraft Component Design and Testing, and Military Low-level Operations. For additional information please contact: UK Crawley (0293) 573225.

CHAMBERS FIELD
BIRD AIRCRAFT STRIKE HAZARD PLAN

Prepared by:

USDA-APHIS-WS

Prepared for:

Airfield Management
NAS Oceana Air Detachment Norfolk

September, 1999

ENCL (2)

Table of Contents

CHAMBERS FIELD BASH PLAN
CONTENTS

CHAPTER 1

GENERAL

1.1 SITUATION

1.1.1 General: A bird aircraft strike hazard exists at Naval Air Station (NAS) Oceana Air Detachment Norfolk (Chambers Field) and its vicinity due to resident and migratory bird species. Daily and seasonal bird movements create various hazardous conditions. This plan establishes procedures to minimize the hazards at Chambers Field. No single solution exists to this BASH problem, and a variety of techniques and organizations are involved in the control program. This plan is designed to:

(a) Establish a Bird Hazard Working Group (BHWG) and designate responsibilities to its members.

(b) Establish procedures to identify high hazard situations and to aid supervisors and aircrews in altering or discontinuing flying operations when required.

(c) Establish aircraft and airfield operating procedures to avoid high-hazard situations.

(d) Provide for disseminating information to all assigned and transient aircrews on bird hazards and procedures for bird avoidance.

(e) Establish guidelines to decrease airfield attractiveness to birds, by eliminating, controlling, or reducing environmental factors which support birds.

(f) Provide guidelines for dispersing birds when they are present on the airfield.

(g) Identify organizations with authority to upgrade, initiate, or downgrade Bird Hazard Conditions (BHC).

(h) Establish local procedures for reporting of damaging/non-damaging bird strikes V3750.6.

(I) Establish procedures for collecting bird strike remains.

1.1.2 Background

1. Bird strikes have plagued naval aviation since its early beginnings. The Navy's first loss of life due to a bird strike occurred in 1914, coincidently the same year it obtained its first

aircraft. From March 1995 to March 1997, naval aviators reported 1,420 bird strikes which resulted in 107 aircraft mishaps, 32 FODed engines and more than 108 million dollars in damages. Fortunately, there were no fatalities (Anonymous 1998). However, within the same period, the United States Air Force (USAF) had two major BASH-related mishaps with two aircraft totally destroyed and 24 fatalities. These incidents have heightened the Navy/Department of Defense (DOD) interest in BASH programs. The Naval Safety Center's review of recent United States Navy (USN) bird-aircraft mishaps found that the lack of a BASH Plan was a consistent deficiency.

2. Naval Safety Center data shows that 65 percent of all bird strikes occur within the airfield environment. The Safety Center estimated that only 1 of 4 bird strikes is reported, however, one analysis indicated that less than twenty percent of all wildlife strikes involving US civil aircraft are reported, suggesting that even a larger hazard exists (Cleary et al. 1996, 1997; Dolbeer et al. 1995).

3. A bird-aircraft strike can cause major structural damage to the aircraft and loss of life. Because of aircraft design, mission, and airport environment, Chambers Field based aircraft are vulnerable to bird strikes. The frequent flight training, and low level flying associated with military aircraft increases the vulnerability of Chambers Field based aircraft. The trend towards the development of faster, quieter aircraft is thought to be a primary reason for increases in bird - aircraft strikes (Lovell 1997). Large numbers of birds are attracted to the Norfolk Naval Station due to its proximity to bodies of water such as the Elizabeth River, the Lafayette River, Willoughby Bay, and the Chesapeake Bay. The large flat area of the airfield provides habitat for feeding and loafing birds.

While severe aircraft mishaps by definition are rare events, it is difficult to estimate the absolute risk of a bird strike causing a crash. Instead, in aviation, it is customary to examine leading indicators that are correlated with mishap risk but occur much more often, i.e., bird populations, near misses, engine damage and reported strikes. Increases in these factors are considered to show a deterioration in the margin of safety, even if no mishaps take place. Historically, rises in leading indicators were a prelude to major mishaps.

4. The greatest loss of life due to a bird strike occurred in 1960, when a Lockheed Electra (civilian version of the P-3) ingested European Starlings into 3 of its 4 engines on takeoff and crashed, killing 62 of the 73 aboard. Likewise, in 1995, an AWACS at Elmendorf AFB ingested Canada geese into two of four engines and crashed, killing all 24 aboard. Although these crashes occurred 25 years apart, they illustrate that the risk of having another major accident is still very much present. An effective BASH program can reduce the relative risk.

1.1.3 Airfield Installation Description

1. Chambers Field is an active military airfield serving over 300 air operations per day (1998 figures). The primary mission of the air station is to operate a major airfield while providing services to the tenant commands and other customers. The primary aircraft types using

the airfield runways and heliports are C-2, C-5, C-9, C-10, C-12, C-17, C-20, C-21, C-130, C-141, H-3, H-46, H-60, 747, 707, L-1011, P-3, light civil, LJ-35, F-18, and transient aircraft from various Navy and other military commands.

1.1.4 Local Area

1. Chambers Field is located within the confines of Naval Station (NS) Norfolk. It is located at 36 56.15 north, 076 17.22 west. Chambers Field adjoins NS Norfolk to the west, and is located directly north of and adjacent to the city of Norfolk, Virginia. There are 490 acres within Chambers Field's boundaries. The airfield elevation is 15 feet above sea level.

1.1.5 General Topography. Chambers Field has generally level topography; however, drainage ditches and low areas hold temporary standing water.

1.1.6 Vegetation Cover Types. Five major types of vegetation cover can be found on the Chambers Field complex: short grass, long grass, shrubs, woodland, and marsh/wetland.

1.1.7 Habitats. Systematic surveys of bird life on NS Norfolk have tallied over 60 different bird species within the eight major habitat types found on the station (Appendix B). The eight major habitats are paved areas (including roads, runways and taxiways), short grass, long grass, shrubs, woodland, river, shoreline, and marsh/wetland. Additionally, structural perch sites and standing water are present on the station and attract large numbers of individual and flocking birds. The combination of all these environments and attractants increases the potential for a serious bird strike incident.

1.2 Species. Chapter 5 contains descriptions of the birds of concern and management recommendations regarding the birds of concern.

1.3 EXPLANATION OF TERMS

1.3.1 WS. Wildlife Services. A program within the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS-WS) which can provide BASH assistance, technical assistance, and direct control of wildlife damage.

1.3.2 Active Bird Dispersal. Harassment techniques employed to disperse birds from airfield and surrounding areas. Methods may include chase, pyrotechnics, bioacoustics (i.e., recorded distress call and sirens), and lethal control.

1.3.3 BASH. Bird Aircraft Strike Hazard. General term to describe bird hazards and bird hazard programs.

1.3.4 BHWG. Bird Hazard Working Group. Local committee of base and unit offices concerned with bird hazards. Executes and makes recommendations to the BASH Program.

1.3.5 BHC. Bird Hazard Condition. A bird hazard alert condition used to warn aircrew of bird activity.

1.3.6 BHC HEAVY. A severe BHC indicating heavy concentrations of birds on or immediately adjacent to the runway which presents an immediate hazard to flight operations; or any concentration of birds that presents a danger to aircraft.

1.3.7 BHC MODERATE. A BHC which indicates that moderate concentrations of birds are in a location that represents a probable hazard to flight operations.

1.3.8 BHC LIGHT. A bird watch condition which indicates sparse bird activity on the airfield and a low probability of hazard.

1.3.9 BASH Advisory. A radio transmission from ATC or aircrew reporting specific bird hazard information. May be real time or disseminated in Automatic Terminal Information System (ATIS) broadcasts.

1.3.10 Bird Detection and Dispersal Team (BDDT). The designated Transient Line Field Support crew which reports BHC's and disperses problem birds via chase, pyrotechnics, bioacoustics, lethal control and other methods.

1.3.11 Lethal Control. Technique used to remove problem birds permanently from the airfield and hangars when other scare tactics are ineffective. Methods may include shooting, trapping, and use of registered toxicants. Permits may be required, contact base Natural Resources Manager or Regional Manager for assistance.

1.3.12 Pyrotechnics. Noise producing devices discharged from 15mm launchers or 12 gauge shotguns. Used by BDDT to disperse birds away from runways and airfield.

1.3.13 Bioacoustics. Recorded tapes of bird distress calls used by the BDDT to scare birds off the airfield.

1.3.14 Propane Cannons. Stationary, non-projectile, sound producing devices used to disperse birds.

1.3.15 Bird Strike. Any contact between a bird or bat and an aircraft, whether or not damage occurred.

1.3.16 Transient Line (T Line). Crew responsible for parking and servicing of station and transient aircraft.

1.3.17 Transient Line Field Support. Crew responsible for maintenance of E-28 Emergency Arresting Gear. The BDDT will be comprised of Field Support personnel and will be

responsible for BHC reporting and bird detection and dispersal on Chambers Field. Field Support will also be utilized for lethal control measures within the limits of their training.

CHAPTER 2

ORGANIZATIONAL TASKS AND RESPONSIBILITIES

2.1 BIRD HAZARD WORKING GROUP (BHWG)

2.1.1 General. The Bird Hazard Working Group is organized to implement and monitor the BASH Plan. It allows base offices affected by bird problems the opportunity to meet and discuss possible solutions. The BHWG shall meet quarterly in conjunction with the with the corresponding monthly safety meeting.

2.1.2 Composition. As a minimum, the group shall have a representative assigned from the following offices:

a. Airfield Management
b. Aviation Safety
c. Regional Environmental Group, Natural Resources Section (Natural Resources)
d. Air Traffic Control
e. Transient Line Field Support
f. Station Weapons (as required)
g. Station Security (as required)
h. USDA-APHIS-Wildlife Services (as required)

2.1.3 Authority. The Air Operations OIC is responsible for the BASH Program and has approval authority for all BHWG recommendations. BHWG Co-chairpersons shall be appointed, normally one representative each from Operations and Natural Resources Departments since the majority of BASH actions are coordinated through these departments. The BASH Program is a part of the Aviation Safety Program, and as such, the Aviation Safety Officer shall monitor the effectiveness of the program.

2.1.4 BHWG Meeting Schedule. The BHWG will meet quarterly incorporated with the monthly safety meeting or as often as necessary to stay current on bird hazards and to discuss solutions, results, and effectiveness of the program. An important concept is that the BHWG address problems as they develop, before they create a serious hazard.

2.1.5 BHWG Function

1. Execute and update the BASH Plan.

2. Collect, compile, and review data on all bird strikes.

3. Identify and recommend actions to reduce bird hazards.

4. Recommend changes in operational procedures.

5. Prepare informational programs and safety briefings for aircrews.

2.2 AVIATION SAFETY OFFICER

1. Attend BHWG meetings.

2. Monitor the effectiveness of the BASH program.

3. Conduct periodic reviews of the BASH program using the self-inspection checklist contained in Appendix A.

4. Ensure BASH program is a part of safety reviews conducted by the Naval Safety Center.

5. Publish operating instructions/checklists and conduct training as appropriate to support this plan.

6. Make BASH awareness a priority during periods of high bird density (winter months).

7. Issue procedures for the preservation of bird remains if discovered on an aircraft or during FOD sweeps. Even the smallest fragment of a feather should be preserved for identification. A tag with the date, time, and location of bird strike should be placed in a bag with the remains.

8. Encourage that aircrews comply with mandatory reporting of all bird strikes, damaging and non-damaging.

2.3 SQUADRON SAFETY OFFICERS

1. Attend BHWG meetings.

2. Issue specific guidance to maintenance personnel for reporting of all discovered bird strikes on aircraft to the Aviation Safety Officer.

3. Ensure bird strikes are reported per Appendix B and this instruction.

4. Ensure any applicable bird activity data is readily available to aircrews during mission planning.

5. Make bird hazards a regular topic at flying safety meeting. Use movies, articles, and

other information, as appropriate, to maintain awareness.

6. Issue specific guidance for units on:

   a. Procedures and restrictions to be followed under hazardous BHC's.

   b. Bird strike reporting, damaging and non-damaging.

   c. Bird remains collection and preservation.

2.4 OPERATIONS/AIRFIELD MANAGEMENT

1. Designate BASH Officer who will co-chair the BHWG and a facilities representative for the BHWG.

2. Maintain a file of all bird strikes occurring at Chambers Field.

3. Through the Aviation Safety and BASH officer, provide liaison with all aviation activities at Chambers Field concerning BASH issues.

4. Develop procedures to reduce BASH hazards.

5. Monitor grass height, drainage ditches, fill or street sweep low areas that collect water following rain events.

6. Assist squadrons in development of in-flight avoidance procedures.

7. In concert with Natural Resources, establish and maintain a trained BDDT.

8. Develop a continuing information and education program to disseminate bird hazard information.

9. Report all bird strikes to Natural Resources.

10. In conjunction with the Aviation Safety Officer, conduct periodic exercises and inspections of the BASH program.

11. Provide animal remains to Natural Resources for identification.

12. Establish a BASH awareness training program for all Airfield Management, ATC, and Airfield Facilities personnel.

13. Provide vehicle(s) for BDDT and ensure quick maintenance turnaround of BDDT

vehicles.

14. Based upon the direction of the BHWG, maintain runway lateral and approach zones in a manner that is least attractive to birds.

15. Ensure training is conducted for all maintenance personnel (sweeper, etc.) Covering responsibilities, actions, and techniques applied under this instruction.

16. Obtain signs to discourage wildlife feeding. Signs should be placed in sensitive areas to educate the public to the hazard posed by feeding any wildlife, particularly waterfowl and gulls.

17. Ensure trash receptacles have covers which prevent bird access and are emptied on a timely basis.

18. Brief bird hazard awareness and the BASH program to all hosted aviation units.

2.5 AIR TRAFFIC CONTROL TOWER

1. In the absence of BDDT, or at the discretion of the Tower Supervisor, declare BHC's based on reported sightings or BHC criteria in Paragraphs 3.2. and 3.3.

2. Pass BHC information to Flight Planning.

3. Advise the Operations Duty Officer anytime BHC HEAVY (Severe) condition is declared.

4. Alert BDDT of observed bird hazards.

5. Allow BDDT priority movement on the airfield to disperse birds on or near active runway.

6. Issue bird advisory information to aircraft over air traffic control frequencies.

7. Establish a training program covering this instruction for all ATC personnel. This training will be documented and reviewed annually.

2.6 NATURAL RESOURCES

1. Request and maintain annual funding in support of the BASH Program.

2. Provide co-chairperson for BHWG.

3. Implement changes to environmental conditions and management practices to reduce bird strike potential. Changes will be presented to BHWG.

4. Prepare necessary environmental documentation for airfield modifications initiated by Natural Resources as required by law.

5. Conduct a bird survey (of systematic random sample design) on the airfield once a month.

6. Maintain and review a file of all bird strikes occurring at Chambers Field.

7. Provide Natural Resources/WS support as outlined below:

   a. Obtain and maintain Federal and State permits required for lethal removal of protected bird species.

   b. Provide for the training of BDDT personnel. This training will focus on the techniques of bird harassment and firearms safety.

   c. Alert airfield management of any new bird hazards and unusual bird activity.

   d. Coordinate wildlife studies and surveys as necessary to improve wildlife hazard control, assess the potential impacts of control activities on wildlife populations and distribution, and evaluate the potential effects of wildlife displacement.

2.7 SECURITY DEPARTMENT

1. Provide representation to BHWG when required.

2. Ensure training is conducted for all security personnel concerning BDDT weapons procedures as applied under this instruction.

3. Discourage the feeding of wildlife in all areas.

4. Report any overflowing trash receptacles to the BHWG.

2.8 WEAPONS DEPARTMENT

1. Provide representation to the BHWG when required.

2. Develop firearm check in/out procedures.

3. Provide Ready Storage Lockers (RSL) for pyrotechnics and ammunition as close to the

airfield as possible for immediate access.

4. Provide 12 gauge shotguns and bird shot ammunition for BDDT. Steel shot must be used when removing offending birds.

5. Provide cleaning supplies for BDDT firearms.

2.9 BIRD DETECTION AND DISPERSAL TEAM (BDDT)

1. The primary responsibility for bird detection and dispersal falls under the control of Transient Line Field Support. A trained BDDT will be established to carry out detection and dispersal activities. Training will be provided by Natural Resources or under contract with USDA-APHIS-WS.

2. BDDT's will be active on the airfield as needed and will be on call 24 hours a day. The BDDT will have immediate access to bioacoustic and pyrotechnic equipment for bird dispersal.

3. Assist in BHC reporting to Air Traffic Control.

4. Report any changes in bird activity to the Natural Resources Manager and file records of bird dispersal/control activities with the Natural Resources Manager.

2.10 BHWG CONTACT INFORMATION

1.	Commander, U.S. Navy Officer in Charge	Commander R.W. Batten, JR.	(757) 444-3981
2.	Airfield Management:	Gable G. Himmelwright, III	(757) 444-2442 (757) 444-8082
		Benny Holmes	(757) 444-2442 (757) 444-8082
3.	Aviation Safety:	Lieutenant Commander Tom Needham	(757) 445-4248 (757) 445-2137
4.	Natural Resources:	Brian Hostetter	(757) 433-3438
		Deanna R. Higginson	(757) 322-4940
5.	Air Traffic Control:	Karen Mason	(757) 444-8082
6.	T Line/Field Support:	Donald P. Francisco	(757) 444-4029
		Bill Campbell	(757) 444-3519
7.	Station Weapons:	Lieutenant Commander Michael Price	(757) 444-0093
8.	Station Security:	Jean Meyers	(757) 322-2563
		Tim Atwell	(757) 322-2380
9.	USDA-APHIS-WS:	Martin S. Lowney	(804) 739-7739
		Grafton E. Cromwell	(804) 739-7739
		Dage Blixt	(703) 417-1778

CHAPTER 3

CONCEPT OF OPERATIONS

3.1 GENERAL. The BASH program is an ongoing process which includes both information dissemination and bird control techniques. Of these processes, the most critical is the aircrew notification and warning system. This system establishes procedures for the immediate exchange of information between ground agencies and aircrews concerning the existence and location of birds that pose a hazard to flight safety.

3.2 BIRD HAZARD WARNING SYSTEM. The following BHC's will be used at Chambers field to warn aircrew and support personnel of the current bird threat to operations. Bird locations should be given with the condition code (Anonymous 1998).

3.2.1 BHC HEAVY (Severe)

Generally defined as heavy concentrations of birds (more than 15 large or 30 small) on or immediately adjacent to the active runway or other specific locations (heliports) that present an immediate hazard to flight operations. Active dispersal will be initiated during this condition.

***************WARNING**************
Landing or departing in condition HEAVY may result in aircraft damage from a bird strike.

Note: HEAVY may also be declared when birds of any size or quantity present an immediate hazard.

3.2.2 BHC MODERATE. Generally defined as moderate (concentrations of 5-15 large or 15-30 small) birds observable in locations that represent a probable hazard to flying operations. Positive actions should be taken to disperse the birds that are causing the hazard.

3.2.3 BHC LIGHT. Sparse bird activity on and above the airfield (less than described in MODERATE) with a low probability of hazard.

Note

Personnel making BHC reports may not necessarily follow the numerical numbers in Table 1. These are just a guide. If, in the judgement of the observer, the number of birds is less than those indicated for a specific BHC, but a hazard is believed to exist, higher BHC may be declared. Example: Condition HEAVY may be declared if one Canada goose is

immediately adjacent to the active runway.

Table 1. CHAMBERS FIELD BIRD HAZARD CONDITIONS

BHC	MODIFIER	BIRD ACTIVITY
HEAVY	**SEVERE**	**15+ large birds, or 30+ small birds**
MODERATE	**MODERATE**	**5-15 large, or 15-30 small.**
LIGHT	**LOW**	**Sparse bird activity**

3.2.4 Bird Watch Alert. A general warning that indicated when weather, time of day, and seasonal conditions make an influx of birds onto the airfield likely. Upon receipt of special conditions, airfield management (AODO) will set the alert and the Tower will include a general statement in ATIS broadcasts.

3.2.5 BASH Window. BASH windows are based on bird survey data that show specific times when a hazard is known to exist, i.e., afternoon crow activity, etc. When BASH windows are set, aircraft operation during these time frames are not recommended. The AODO will post BASH windows on the rolling NOTAMS display. Squadron flight schedulers should avoid scheduling operations during BASH windows. Guidance for aircraft operations are contained in Chapter 4.

3.3 BIRD HAZARD CONDITION REPORTS

3.3.1 Bird Hazard Reporting. The Operations Officer, AODO or designated representative ensures hazardous conditions are reported. Declaration of a BHC will be based on the following:

a. Visual observation of bird activity on or near airfield by Tower or BDDT personnel.

b. Information relayed by ATC Radar, airborne and taxiing aircraft.

c. Observations relayed to Tower by any of the following personnel: airfield facilities, weather observers, ground electronics maintenance, airfield lighting technicians, crash crews, arresting gear maintenance, sweepers, mowers, security police, transient line personnel, and any other personnel driving on the airfield.

d. Bird activity observed using NEXRAD radar.

3.3.2 Bird Detection/Dispersal Team (BDDT) BHC Reporting

1 The most accurate and real-time reporting of bird hazard information is obtained from the BDDT. The BDDT is in the best position to make accurate BHC reports due to its frequent

presence on the airfield.

2. When the BDDT is on the airfield, they will have the primary responsibility to make BHC reports to the Tower. The BDDT will make reports to the tower three times daily when the BDDT is present on the airfield. The BDDT will continue to make real-time reports and update BHC as hazard conditions change. The most effective BASH avoidance would be to have the BDDT on the airfield at all times during operations, however this can not be expected.

3. Once BHC HEAVY (Severe) has been declared, the condition will be updated, at a minimum, every 5 minutes until downgraded. When aircraft are holding for condition HEAVY, the BDDT will report to the Tower immediately if initial attempts to disperse the birds have failed.

3.3.3 BHC Declarations by Maintenance Personnel, Sweepers, Grass Mowers, and others

1. If a bird hazard exists, other personnel may notify the BDDT, Tower or AODO as applicable. This notification can be made on a radio net or by telephone (757) 444-2442 or (757) 444-7598. Reports should include:

a. Identity of caller (agency for ground personnel, call sign for aircrews.)

(1) Location.

(2) Altitude.

(3) Time of sighting.

(4) Approximate number of birds.

(5) Type of birds (if known).

(6) Behavior of birds (soaring, flying, roosting, etc.)

3.3.5 Aircrew Reporting. Aircrews should report significant activity as follows:

a. Notify Tower

b. On a low level route/range area, notify ATC and Chambers Field Schedules after landing.

3.4 DOWNGRADING BHC. Once a BHC has been declared, it shall be downgraded commensurate with updated information. The Control Tower will make the final determination on BHC's and the downgrading of BHC's.

3.5 BIRD HAZARD COMMUNICATION. Disseminating BHC's is critical to BASH effectiveness. The agencies below will disseminate the BHC by the following means:

3.5.1 Control Tower Communications

1. Include BHC on ATIS broadcasts.

2. Notify inbound/departing aircraft of BHC if aircraft has received ATIS and the BHC has changed.

3. The Tower Supervisor will direct the BDDT to the location where the wildlife is posing a problem.

4. Pass BHC to AODO/Flight planning.

5. For rapidly changing BHC place a statement on ATIS advising aircrews to contact Ground, Tower, or Final Controller for the latest BHC.

6. If BHC HEAVY is declared for extended periods of time and will impact flying operations, Tower will notify AODO.

3.5.2 AODO Communications

1. Notify the Operations OIC when the BHC is changed to Condition HEAVY.

2. Notify METOC of BHC reports for inclusion on Weathervision.

3. Pass Heliport BHC to Tower.

3.5.3 METOC Office Communications.

1. Post BHC in the remarks section of the Weathervision display.

2. Notify AODO of birds detected by NEXRAD.

3.5.4 Flight Planning Communications.

1. Flight Planning office will, upon receiving the BHC from the Tower, activate the appropriate warning light color display in Base Operations.

2. Provide BASH information and warning to local and transient aircrews.

3.6 BIRD DETECTION/DISPERSAL TEAM PROCEDURES. BDDT's will be activated on

an as-needed basis.

a. Prior to initiation of dispersal actions a BDDT member will coordinate the location and methods with the Tower prior to dispersal activities on the duty runway.

b. Horns, sirens, distress calls and pyrotechnics should be used to harass birds off the airfield. These methods can be used individually or combined. Distress tapes must match the bird species being harassed to be effective. Pyrotechnics consist of 15mm screamers and 12 gauge cracker shells.

d. Propane sound cannons can be placed around the airfield and moved periodically to prevent habituation.

e. If the methods above do not work or the birds become accustomed to the hazing, it may become necessary to remove several birds via lethal methods to reinforce the dispersal methods.

f. When the target flock of problem birds are dispersed, Tower shall be notified so the BHC can be lowered.

NOTE

Lethal control shall be within depredation permit guidelines.

3.7 BASH DISPERSAL EQUIPMENT

3.7.1 General. There are a variety of bird dispersal techniques available for use at Chambers Field including static deterrents, bioacoustics, pyrotechnics, and lethal control. Any or all of these may be used at Chambers Field to control birds. The BDDT are specially trained in the use of this equipment with the exception of traps and registered toxicants.

3.7.2 Static Deterrent Devices.

1. Static deterrents include, but are not limited to: propane cannons, scarecrows, silhouettes, and effigies. They may be effective in bird deterrence for short periods of time on some bird species. Static devices are designed to augment the activities of the BDDT. At no time should static deterrents be considered a replacement for a BDDT. Static devices should be moved by the BDDT 50-100 feet from their existing locations at least once daily. This activity will inhibit the decline in their deterrent effect that can occur as wildlife begin to become accustomed to the device.

3.7.3 Propane Cannons. The BDDT can position and operate propane sound cannons based on

active runway, bird locations, and air traffic density. If propane cannons are used, locations should be changed daily to avoid habituation by the birds.

3.7.4 Bioacoustics. Bioacoustics are audio taped distress of actual birds or predator calls. Special care must be taken to play the tape in short intervals to prevent habituation by birds. BDDT will play the tape 20-30 seconds, then pause briefly. Repeat as required. Birds should respond by taking flight or becoming alert. These calls may be effective for gulls, blackbirds, starlings, and crows. Pyrotechnics should be used in conjunction with bioacoustics if bioacoustics alone are ineffective.

3.7.5 Pyrotechnics. Pyrotechnics are effective for dispersing many species of birds. Pyrotechnics are fired from 15mm pistol launchers and 12-gauge shotguns. Pyrotechnics may include a variety of devices similar to commercial fireworks, including bangers, whistlers, screamers, and salutes. These devices are shot from the pistol launcher/shotgun into flocks or near individual birds to frighten them away. Proper procedures for using pyrotechnics are as follows:

a. Liaison with the tower prior to discharging pyrotechnics and coordinate the location. If aircraft operations are imminent, ensure the BHC is raised prior to initiating dispersal operations.

b. Inform the tower prior to discharging pyrotechnics on the airfield.

c. Use ear and eye protection.

d. If applicable, play the distress call 20-30 seconds to get the birds alert. Gulls may gather around vehicle that is playing the distress tape. They are responding to one of their own who they believe is "in distress."

e. Loading the 15mm launcher in the vehicle is not recommended unless personnel have had special training. Step outside, cock the gun, load the cap, then load the pyrotechnic in the barrel.

f. Point the gun at 45 degrees or higher into the air, preferably toward the flock of birds. Face AWAY from the gun and pull the trigger.

NOTE

To avoid having pyrotechnics reported as explosives or gunfire, Security should be aware of the occasional pyrotechnic use on the airfield.

3.7.6 Lethal Control (Depredation). Occasional lethal removal of birds reinforces the other harassment methods. Shooting one or two from a flock then following with a volley of

pyrotechnics is generally a very effective strategy for deterrence. Domestic pigeons, European starlings, and house sparrows are not protected and may be removed without a permit (see 50 CFR 21.43 and Virginia regulations). Crows, grackles, and blackbirds may be shot with a shotgun without a permit (see 50 CFR 21.43) Lethal control may also include the use of traps and registered toxicants. A permit may be required to remove any other species of bird. Natural Resources will coordinate with federal and state wildlife agencies for appropriate permits.

3.7.7 Record Keeping. BDDT's will maintain records of bird dispersal. These records will document all bird dispersal operations to include species, location, methods, and number of birds dispersed. These will be forwarded on a monthly basis to Natural Resources. Monthly data will be summarized at BHWG and Aviation Safety Meetings.

3.8 CRASH CREW PROCEDURES. If fire-fighting crews detect the presence of birds on the airfield, they will pass the information to the BDDT or Tower.

3.9 LAND MANAGEMENT PROCEDURES. One of the most effective and permanent methods of discouraging birds from using the airfield is the removal of attractive habitat features. Passive control methods include:

3.9.1 Managing Grass Height

1. Mow to maintain a uniform grass height between 6 and 12 inches (as directed by BHWG). Long grass discourages flocking species because reduced visibility disrupts interflock communication and prevents predator detection. When grasses do not naturally achieve at least 10 inches in height they should be encouraged to do so. Grass heights in excess of 14 inches may attract rodents and will also result in the grass laying flat (lodging) thus reducing its deterrent effect to flocking species.

2. Grass heights below 6 inches are of equal concern, as they are generally more attractive to birds which feed on the easily accessible worms, insects, and seeds. Begin mowing adjacent to runways and finish in the infield or outer-most grass areas. This will cause insects and other animals to move away from aircraft take-off and landing areas.

3. Cut grass before it goes to seed to discourage seed eating birds.

3.9.2 Controlling Broad-leafed Weeds. Keep broad-leafed weed to a minimum on the airfield. Apply herbicides as necessary for control. Broad-leafed weeds attract a variety of birds, may produce seeds or berries, and may limit grass growth. Obtain assistance in herbicide selection for weed control, appropriate grass seed selection, fertilization, and erosion control vegetation from BHWG recommendations, the Natural Resource Conservation Service, or the Agricultural Extension Service within the county.

3.9.3 Planting Bare Areas. Eliminate bare areas on the airfield. Plant grass as necessary and

appropriate to maintain ground cover at 6-12 inches in height.

3.9.4 Fertilizing. Selectively stimulate grass growth to promote a uniform cover at 6-12 inches in height. Irrigation may be used to support turf growth if it is not found to attract birds..

3.9.5 Remove Edge Effect. Maintain the airfield as uniformly as possible to reduce the transition zone between two distinct habitat types (e.g., brush to grassland).

3.9.6 Leveling of Airfield. Level or fill high or low spots to reduce attractiveness to birds and prevent standing water.

3.9.7 Removing Dead Vegetation. As soon as possible, remove dead vegetation such as snags, brush piles, grass clippings, etc., and the cover it affords.

3.9.8 Removing bird and animal carcasses from the airfield. This is to avoid attracting scavengers that feed on them. Forward remains, which may have been caused by collision with aircraft, to Natural Resources for identification. Bird strike remains that can not be identified by airfield personnel can often be identified by a local biologist or by sending feather remains to

Cleary, Edward
Federal Aviation Administration
Office of Airport Safety & Standards
Safety & Operations Division, AAS-317
800 Independence Ave., SW, Room 615
Washington, DC 20591
(202) 267-3389
(202) 267-5383 fax

3.9.9 Pest Control. Invertebrates and rodents are key food sources for many birds. Periodically survey and reduce these pests when required. Registered pesticides and traps can reduce pest populations. Only EPA approved pesticides are authorized, and they must be used strictly according to label instructions.

3.9.10 Maintaining Drainage Ditches. Regularly inspect ditches to keep them clear. Maintain ditch sides as steeply as possible (minimum slope ratio of 5 to 1) to discourage wading birds and emergent vegetation. Improve drainage as necessary to inhibit even temporary ponds or puddles. When able cover ditches with netting/plastic fencing if necessary.

3.9.11 Employing Erosion Control Vegetation. Use vegetation that is appropriate for the region and does not produce seeds at heights below 14 to 18 inches.

3.9.12 Controlling Waste Disposal. Landfills are the most significant attractant to hazardous bird species. If a landfill must be used, Make it as unattractive to birds as possible by

minimizing exposed waste. Ensure that all waste receptacles are inaccessible to birds.

3.9.13 Eliminate Roosting Sites. Dense stands of trees on and around the airfield provide roosting cover for crows and other birds. Roost sites may be controlled by vegetation management. Remove or prune trees to reduce the number of available perches if necessary.

3.9.14 Bird Proof Buildings and Hangars. Birds should not be tolerated in any portion of the airport area. Birds that utilize buildings and hangers may use the aircraft movement areas to feed and loaf. Often, bird-proofing of buildings and hangars is required to exclude pigeons, sparrows, and swallows. Excluding birds from a structure they currently utilize will often displace them to an adjacent structure. Existing birds should be destroyed (in accordance with the depredation permit) prior to the exclusion effort whenever possible. Denying access by screening windows, closing doors, and blocking entry holes is most effective. Natural Resources, USDA-APHIS-WS, or pest management companies are available to provide technical assistance and direct control of wildlife damage. When necessary consider:

a. Air rifles. High quality equipment and skilled personnel are required.

b. Netting. Install under superstructure to exclude birds from roosting areas.

c. Registered toxicants.

d. Trapping.

e. Design features. If Designing a new hangar, consider locating supports on the exterior.

f. Door coverings. Use netting or plastic strips suspended over the doors to exclude birds. Ensure no tears or holes are present that allow birds access to the hangar.

g. Sharp Projections. Use in limited areas such as ledges and overhangs, or small places where birds cannot be allowed. This method is prohibitively expensive for large areas.

3.10 MANAGING OFF-BASE LAND USE. The Navy cannot control off-base land use, however, when a proposed land use may increase or alter bird populations and habits (i.e., landfills, etc.), the Navy's concerns should be addressed at public hearings and zoning meetings. The Navy's concerns may also be addressed by contacting a city official or project manager. Natural Resources and Public Works shall monitor off-base land use and report findings to the BHWG.

CHAPTER 4

BIRD STRIKE REPORTING

4.1 BIRD STRIKE REPORTING

1. Post flight follow-up and reporting of bird strikes are an essential and important part of the BASH program. After a strike:

a. If airborne, inform control tower and complete emergency landing, if required.

b. After post-flight inspection, preserve any remains (however slight) and notify the Aviation Safety Officer at (757) 445-4248 or (757) 445-2137. Natural Resources should be contacted to collect remains, take pictures and assist aircrews in completing a Bird Strike Form (Appendix B). After-hours strike reports may be called into the AODO (757) 444-7598.

c. Report strikes even if no bird remains are found on the aircraft. BDDT and airfield facilities personnel may be able to retrieve the bird on the airfield. Information on reporting strikes is available at the Naval Safety Center web page at www.safetycenter.navy.mil/aviation/Operations/BASH/bashform.htm

d. Follow up local reporting by completing a Bird/Animal Strike Hazard Report" per instruction 3750.6. Both damaging and non-damaging strikes are required to be reported. Forward a copy to Natural Resources and the Aviation Safety office.

2. The BASH team also encourages aircrew to report near-misses that involve evasive action or whenever the proximity of the miss is "too close for comfort." These may be called in to Air Operations. No forms required.

4.6 BIRD IDENTIFICATION

1. All strike data is entered into Naval Center data bases to help track and identify bird hazards. Therefore, it is necessary to know which species are causing bird strike problems so appropriate measures can be taken. Identification of bird remains is essential. If bird remains are found during FOD sweeps or on aircraft, the following preservation procedures shall be followed:

a. During normal working hours, leave the remains on the aircraft and call the tower. They will send a representative to remove the pieces.

b. After hours or on weekends, notify AODO at (757) 444-2442 or (757) 444-7598. If a

BASH/Natural Resources representative is unavailable, remove all remains from aircraft, place in a zip-lock plastic bag, and store in a refrigerator or freezer. All available remains should be saved for identification. It does not take much (remains) to identify the bird species. Even if just a small part, feather or bloody smear with down, the species can be identified through microscopic techniques. The next work day, for remains pick up, call Brian Hostetter (757) 433-3438, Linda Hicks (757) 462-7062, or NASO Game Wardens (757) 433-2151.

CHAPTER 5

LOCAL BIRD SPECIES OF CONCERN

5.1 GENERAL. The following is a summary of birds within the airfield environment that present the greatest risk to flight operations. This chapter on species of concern to aviation at Chambers Field was developed from data collected during the ecological study (Appendix D). Each section discusses the reasons for concern and a brief description of how the risks can be managed.

There are a number of effective techniques that can reduce the number of birds in the airport area. In general, the techniques fall into three categories: making the environment less attractive to birds, scaring the birds, or reducing the bird population. Each control measure will require action by one or more tasked organizations described in Chapter 2.

5.2 Chambers Field Avian Hazards

5.2.1. Gulls. Gulls present a hazard to aircraft due to their body size and flocking behavior and are among the most commonly struck bird groups (Cleary et al. 1998, Seamans et al. 1995). Gulls were involved in 31% of all bird- civil aircraft strikes of known species reported in the United States from 1992-1996. Additionally, gulls caused 16% of damaging bird-aircraft strikes at civil airports (Cleary et al. 1997). Gulls were involved in 40% of reported bird strikes at Chambers Field from 1981 through 1997 (Naval Safety Center Data).

Ring-billed gulls, herring gulls, laughing gulls, and greater black-backed gulls are the most common species of gulls observed in the Chambers Field environment. Gulls are commonly found on the airfield due to their feeding habits and preference for flat, open areas to rest. Gulls make up 35% of the total number of birds observed during the ecological study from March 1998 to February 1999, with the largest number of gulls observed during December. The majority of gulls were observed loafing on the parking lot and sand beach at Vista Point (70% of gull observations were made at observation point 9). Gulls are more numerous on the airfield during winter. Airfield Management has reporting large numbers of gulls on the airfield during rainy weather, when they are feeding on exposed earthworms.

Do not allow gulls to establish a habit of using the airfield to feed, breed, or loaf. Maintenance of grass height between 6 and 12 inches is critical in reduction of gull numbers because taller grass discourages feeding and loafing. Even with this in effect, gulls may inhabit the airfield, particularly during inclement weather. Persistent harassment using pyrotechnics and bioacoustics is necessary to discourage these birds. Shooting some gulls to reinforce harassment methods may be required. Other techniques such as propane cannons should be considered.

Feeding of gulls and all wildlife should be discouraged at Norfolk Naval Air Station. Signs that discourage feeding should be posted at Breezy Point Park and Vista Point. All trash receptacles should be tightly covered to prevent birds from feeding on the garbage.

5.2.2 Blackbirds and Starlings. European starlings and other closely related blackbirds (i.e. common grackles, brown-headed cowbirds, and red-winged blackbirds) pose a high risk to

aircraft safety due to their flocking behavior and body density (Seamans et al. 1995). Starlings are "feathered bullets", having a body density 27% higher than herring gulls (Dolbeer 1997). One of the most serious aircraft collisions occurred in 1960 at Logan Airport in Boston, Massachusetts when an Electra aircraft hit a flock of European starlings and crashed, killing 62 people (Solman 1981). Starlings were identified in four bird - aircraft strikes at Chambers Field from 1981 - 1997 (Naval Safety Center data), however, there were over twenty strikes involving "small birds" and over twenty more strikes involving "birds" reported from 1981 - 1997. Many of the Naval Safety Center's descriptions of bird strikes at Chambers field mention large flocks of small birds. It is likely that European starlings and blackbirds account for a large number of bird - aircraft strikes involving unidentified birds.

Blackbirds and starlings are common on Chambers Field due to their preference for flat, open areas to feed, rest, or stage/pre-roost. Sixty-three percent of the total number of starlings observed were seen from observation points on the airfield. Starlings accounted for 35% of the total number of birds observed during the ecological study from March 1998 through February 1999.

Several methods can be used to control blackbird and starling numbers on the airfield. Maintenance of grass height between 6 and 12 inches is the best method of reducing airfield blackbird and starling numbers. In addition, blackbirds and starlings respond well to an intense frightening program using bioacoustics, pyrotechnics, and shooting. Starlings and blackbirds may be shot with shotguns without permits (50 Code of Federal Regulations part 21.43). Occasional shooting of birds will reinforce other frightening techniques. Removing birds with registered toxicants or traps may also be considered.

5.2.3 Crows. Crows present a hazard at Chambers field due to the large numbers that stage, loaf, and feed on and adjacent to the runway and taxiways. For example, on February 23, 1999 at 16:50, 519 American crows were observed staging on the airfield near Taxiway Whiskey. While individual crows, or small flocks of crows are not considered to be a serious threat to aviation because they appear infrequently in strike records, the large flock of crows at Chambers Field presents a hazard to aviation.

Crows occur on Chambers Field in large flocks, particularly during late afternoon through sunset as they return to roost sites at the airfield. In addition, crows loaf on the airfield in large numbers on some mornings before dispersing to feed. Seventy-six percent of all crows were seen from observation points on the airfield. The majority of crows were observed near the Red Label Area adjacent to Taxiway Whiskey. The towers view of this area is partially blocked by trees along Taxiway Whiskey. It is important that the BDDT patrol this area to harass birds.

There is an active crow roost located in the pine trees near the weapons area, behind Whiskey taxiway. Removal of this roost or thinning of the roost trees is recommended. Bioacoustics, pyrotechnics, and lethal methods can be used to frighten and remove these birds.

5.2.4 Ducks and Geese. Waterfowl (ducks and geese) comprise 12% of all bird-aircraft strikes and 16% of bird-aircraft strikes where civil aircraft were damaged (Cleary et al. 1997). No other bird species cause as many damaging bird-aircraft strikes as waterfowl, except gulls. For example, three Canada goose -aircraft strikes at airports near New York City resulted in over $15

million dollars in damage during 1995 (National Wildlife Research Center, Research Update, 1998). On September 14, 1995 a 757 aircraft struck 10 Canada geese at Dulles International Airport causing $1.7 million dollars in damage to the radome, both engines, and both wings (USDA 1999). On October 6, 1998, 10 Canada geese struck a C12 twin engine propeller plane at Fort Belvoir causing $300,000 dollars in damage to one engine (USDA 1999). Geese have been reported as struck by aircraft at Chambers Field on September 25, 1992, and August 18, 1997 (Naval Safety Center data). A mallard duck was struck at Chambers Field on April 6, 1984.

Canada geese are one of the more dangerous bird species for aircraft to strike because of their large size (8-12 pounds) and because they travel in flocks of up to several hundred birds. Non-migratory (resident) Canada geese presence on and around airports creates a threat to aviation and human safety. There is a very strong relationship between bird weight and the probability of plane damage (Anonymous 1992). For example, there is a 90% probability of plane damage when the bird weighs 70 or more ounces (4 1/3 pounds) verses a 50% probability of plane damage for a 6 ounce (1/3 pound) bird (Anonymous 1992).

Resident Canada geese have been involved in aircraft strikes at Dulles International Airport, Ronald Reagan National Airport, Norfolk International Airport, Roanoke Regional Airport, and Fort Belvoir in Virginia. Some of these Canada goose- aircraft strikes resulted in costly plane repairs, and aborted take-offs and landings.

Military bases in Virginia have grave concern about Canada geese on airfields since a Canada goose -aircraft strike at Elmendorf Air Force Base in 1995 resulted in the death of 24 Air Force personnel because the plane ingested Canada geese into two engines and crashed on takeoff. Langley Air Force Base and NAS Norfolk have altered, delayed, aborted, and ceased flight operations because of Canada geese on their airfields.

The North American resident Canada goose population tripled to 1.8 million birds from 1985 - 1995 (Dolbeer 1997). The resident Canada goose population in Virginia increased from 66,000 in 1991 to 301,000 in 1998 (VA. Dept. of Game and Inland Fisheries, Unpublished data and USDA 1999).

Creeks, ponds, lakes, drainage ditches, etc., surrounding Chambers field are an attraction to waterfowl, particularly if these areas contain emergent or submerged vegetation for feeding, nesting, or shelter. Avoid flying near these areas if possible. Removal of feral ducks and geese from surrounding bodies of water may reduce the attraction of these areas to passing waterfowl. In addition, temporary standing water on the airfield provides an attraction to waterfowl and other birds. When possible, drain water sources and level areas to prevent standing water.

Aggressive harassment of waterfowl on the airfield is recommended. Pyrotechnics and propane cannons are available control techniques. Shooting some geese to reinforce harassment may be necessary.

The local population of resident Canada geese that frequents the airfield, surrounding parks, and golf courses can be reduced and stabilized by removing resident Canada geese and addling/oiling eggs under a permit or with USDA-APHIS-WS assistance.

5.2.5 Hawks and Kestrels. These birds are hazardous to aircraft due to their size and intense focus when hunting prey which makes them oblivious to aircraft operations. A co-pilot was injured at 1100, September 30, 1992 when a hawk flew into the windscreen of an aircraft at

Chambers Field (Naval Safety Center data). Even small birds can be dangerous to aircraft. For example, a kestrel, which weighs 4 ounces, caused an engine shutdown on a B-737 at Nashville, TN in July 1996. This plane aborted take-off, slid off the runway and injured 3 passengers (Dolbeer 1997). Red-tailed hawks, Cooper's hawks, Northern harriers, and American kestrels were present on Chambers Field during the ecological study. These birds become active during mid-morning and remain active until late afternoon. American kestrels were commonly seen perched and hunting near the approach end of runway 10. Red-tailed hawks, Cooper's hawks, and Northern harriers were often seen hunting over tall grass and shrub areas, or perched in trees adjacent to the red label area. Eighty-nine percent of the total number of hawks and kestrels observed were on the airfield.

Hawks and kestrels can be controlled by managing small mammal populations and removing dead trees and other perch sites on the airfield. Reducing tall grass and shrub areas may help reduce the abundance of small mammals (e.g. meadow voles) on the airfield. Attempts can be made to frighten Hawks and kestrels from the airfield, however hawks and falcons are not easily discouraged by harassment. Hawks and kestrels can be captured and relocated or euthanized under a permit or with WS assistance.

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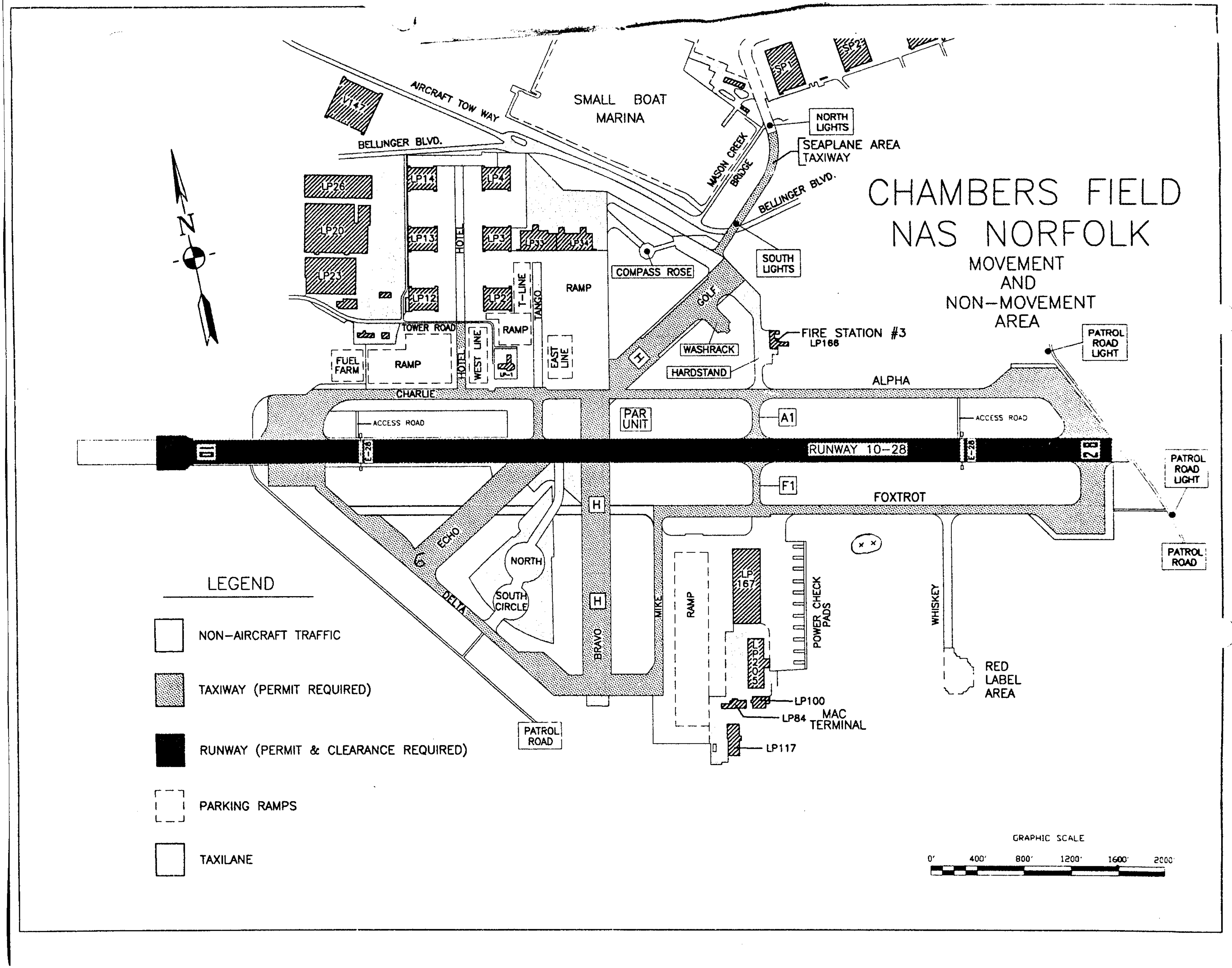
ILLUSTRATION 1

CHAMBERS FIELD NAS NORFOLK
MOVEMENT AND NON-MOVEMENT AREA


CHAMBERS FIELD
NAS NORFOLK
MOVEMENT
AND
NON-MOVEMENT
AREA
SMALL BOAT
MARINA
AIRCRAFT TOW WAY
BELLINGER BLVD.
MASON CREEK
BRIDGE
NORTH
LIGHTS
SEAPLANE AREA
TAXIWAY
SOUTH
LIGHTS
COMPASS ROSE
FIRE STATION #3
LP166
WASHRACK
HARDSTAND
GOLF
ALPHA
CHARLIE
TOWER ROAD
HOTEL
WEST LINE
T-LINE
TANGO
EAST
LINE
RAMP
FUEL
FARM
PAR
UNIT
A1
F1
ACCESS ROAD
RUNWAY 10-28
FOXTROT
ECHO
DELTA
BRAVO
MIKE
NORTH
SOUTH
CIRCLE
WHISKEY
RED
LABEL
AREA
POWER CHECK
PADS
LP100
LP84
MAC
TERMINAL
LP117
LP167
PATROL
ROAD
LIGHT
PATROL
ROAD
LP26
LP20
LP23
LP14
LP13
LP12
LP4
LP3
LP2
SP1
SP2
GRAPHIC SCALE
0' 400' 800' 1200' 1600' 2000'
LEGEND
NON-AIRCRAFT TRAFFIC
TAXIWAY (PERMIT REQUIRED)
RUNWAY (PERMIT & CLEARANCE REQUIRED)
PARKING RAMPS
TAXILANE

APPENDIX A

BASH SELF-INSPECTION CHECKLIST

1. Is the BASH PLAN current and readily accessible for your reference?

2. Are changes and annual reviews posted to the plan?

3. Are all members of the BHWG familiar with their responsibilities as delegated in the BASH Plan?

4. Does the BHWG meet quarterly and do all members attend the meetings?

5. Are BASH topics included in flight safety briefings?

6. Are posters , pictures, maps, etc., related to BASH posted in the aircrew briefing areas , safety bulletin boards, and base operations flight planning areas?

7. Are both damaging and non-damaging bird strikes recorded?

8. Are all damaging and non-damaging bird strikes reported to COMNAVSAFECEN, 375 A St, Norfolk, VA 2311-4393?

9. Are all available bird remains (feathers, beaks, feet) regularly collected for a bird strike?

10. Are bird remains picked up by Natural Resources for identification?

11. Are periodic surveys taken of the airfield and surrounding area to observe potential and actual bird hazards?

12. Are reports of observations and dispersal efforts maintained by the BDDT in order to establish records?

13. During periodic surveys, are areas like standing water and food sources noted?

14. Does the mowing or guideline contract specify that the grass be maintained at a height of 6-12 inches?

15. Have aircraft hangars and buildings been inspected for pest birds?

16. Do bird droppings cause a problem for equipment or aircraft?

17. Is the cost of cleaning up the bird droppings and any damage incurred less than any type of

solution to the problem?

18. Does the control tower warn operations and pilots of birds in the airdrome?

19. Is the BDDT team aggressively harassing birds on the airfield?

20. Does the BHWG suggest ways of altering the situation or changing the habitat to discourage birds from the airfield as well as suggesting elimination or reduction techniques?

APPENDIX B

BIRD SPECIES OBSERVED DURING SURVEYS
MARCH 1998-FEBRUARY 1999

American coot (Fulica americana)
American crow (Corvus brachynchos)
American kestrel (Falco sparverius)
American robin (Turdus migratorius)
American widgeon (Anas americana)
Barn swallow (Hirundo rustica)
Black- bellied plover (Pluvialis squatarola)
Belted kingfisher (Megaceryle alcyon)
Blue jay (Cyanocitta cristata)
Black skimmer (Rynchops niger)
Brant (Branta bernicla)
Brown pelican (Pelecanus occidentalis)
Boat-tailed grackle (Quiscalus major)
Bufflehead (Bucephala albeola)
Canada goose (Branta canadensis)
California gull (Larus californicus)
Canvasback (Aythya valisineria)
Caspian tern (Sterna caspia)
Common grackle (Quiscalus quiscula)
Cooper's hawk (Accipiter cooperii)
Common loon (Gavia immer)
Common tern (Sterna hirundo)
Double- crested cormorant
(Phalacrocorax auritus)
Eastern kingbird (Tyrannus tyrannus)
Eastern meadowlark (Sturnella magna)
European starling (Sturnus vulgaris)
Field sparrow (Spizella pusilla)
Greater black-backed gull (Larus marinus)
Great blue heron (Ardea herodias)
Gull-billed tern (Gelochelidon nilotica)
Great egret (Casmerodius albus)
Greater scaup (Aythya marila)
Herring gull (Larus argentatus)
Horned lark (Eremophila alpestris)
Hooded merganser (Lophodytes cucullatus)
Kill deer (Charadrius vociferus)
Laughing gull (Larus atricilla)
Little tern (Sterna albifrons)
Mallard (Anas platyrhynchos)
Morning dove (Zenaida macroura)
Northern bobwhite (Colinus virginianus)
Northern harrier (Circus cyaneus)
Northern mockingbird (Mimus polyglottos)
Osprey (Pandion haliaetus)
Pied-billed grebe (Podilymbus podiceps)
Red-necked grebe (Podiceps grisegena)
Ring-billed gull (Larus delawarensis)
Red-breasted merganser (Mergus serrator)
Rock dove (Columba livia)
Royal tern (Sterna maxima)
Red tailed hawk (Buteo jamaicensis)
Ruddy duck (Oxyura jamaicensis)
Ruddy turnstone (Arenaria interpres)
Red-winged blackbird (Agelaius phoniceus)
Sanderling (Calidris alba)
Savannah sparrow (P. sandwichensis)
Turkey vulture (Cathartes aura)
Upland sandpiper (Bartramia longicauda)
Yellow- crowned night heron (Nyctanassa violacea)
Yellow-shafted flicker (Colaptes auratus)

ECOLOGICAL STUDY OF BIRD POPULATIONS UTILIZING NAS OCEANA AIR DETACHMENT NORFOLK (CHAMBERS FIELD)

March 1998 - February 1999

Prepared by:

USDA-APHIS-WS

Prepared for:

Airfield Management
NAS Oceana Air Detachment Norfolk

September, 1999

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INTRODUCTION

Birds can pose a hazard to aviation safety. Several bird species have been recognized as a potential threat to aircraft operations at Naval Air Station (NAS) Oceana Air Detachment Norfolk (Chambers Field). Due to previously recorded and unrecorded bird strikes at Chambers Field, the Navy requested that the Wildlife Services program of the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS-WS) perform an ecological study of the bird populations utilizing the Norfolk Naval Station for a Bird Aircraft Strike Hazard (BASH) plan. The information obtained from the ecological study is necessary in order to implement a BASH plan for Chambers Field.

Bird strikes have plagued naval aviation since its early beginnings. The Navy's first loss of life due to a bird strike occurred in 1914, coincidently, the same year it obtained its first aircraft. From March 1995 to March 1997, naval aviators reported 1,420 bird strikes which resulted in 107 aircraft mishaps, 32 FODed engines and more than 108 million dollars in damages. Fortunately, there were no fatalities. However, within the same period, the United States Air Force (USAF) had two major BASH-related mishaps with two aircraft totally destroyed and 24 fatalities (Anonymous 1998). These, and other incidents have heightened the Navy and Department of Defense (DOD) interest in BASH programs. The Naval Safety Center's review of recent United States Navy (USN) bird-aircraft mishaps found that the lack of a detailed BASH plan was a consistent deficiency among naval air stations (Anonymous 1998).

A bird-aircraft strike can cause major structural damage to the aircraft and loss of life. Because of aircraft design, mission, and airport environment, Chambers Field based aircraft are vulnerable to bird strikes. The frequent flight training, and low level flying associated with military aircraft increases the vulnerability of Chambers Field based aircraft. The trend towards the development of faster, quieter aircraft is thought to be a primary reason for increases in bird - aircraft strikes (Lovell 1997). Large numbers of birds are attracted to the Norfolk Naval Station due to its proximity to bodies of water such as the Elizabeth River, the Lafayette River, Willoughby Bay, and the Chesapeake Bay. The large, flat area of the airfield provides habitat for feeding and loafing birds.

Naval Safety Center data shows that 65 percent of all bird strikes occur within the airfield environment. The Safety Center estimated that only 1 of 4 bird strikes is reported; however, one analysis indicated that less than 20% of all wildlife strikes involving US civil aircraft are reported, suggesting that an even larger hazard may exist (Cleary et al. 1996, 1997; Dolbeer et al. 1995). While severe aircraft mishaps by definition are rare events, it is difficult to estimate the absolute risk of a bird strike causing a crash. Instead, in aviation, it is customary to examine leading indicators that are correlated with mishap risk but occur much more often, i.e., bird populations, near misses, engine damage and reported strikes. Increases in these factors are considered to show a deterioration in the margin of safety, even if no mishaps take place. Historically, rises in leading indicators were a prelude to major mishaps.

The greatest loss of life due to a bird strike occurred in 1960, when a Lockheed Electra (civilian version of the P-3) ingested European Starlings into 3 of its 4 engines on takeoff and crashed, killing 62 of the 73 aboard. Likewise, in 1995, an AWACS at Elmendorf Air Force Base ingested Canada geese into two of four engines, crashed, killing all 24 aboard (Anonymous 1998). Although these crashes occurred 25 years apart, they illustrate that the risk of having another major accident is still very much present. An effective BASH program can reduce the relative risk.

STUDY AREA

Chambers Field is an active military airfield. The primary mission of the air station is to operate a major airfield while providing services to the tenant commands and other customers. The primary aircraft types using the airfield runways and heliports are C-2, C-5, C-9, C-10, C-12, C-17, C-20, C-21, C-130, C-141, H-3, H-46, H-60, 747, 707, L-1011, P-3, light civil, LJ-35, F-18, and transient aircraft from various Navy and other military commands.

Chambers Field is located within the confines of Naval Station Norfolk. It is located at 36 56.15 north, 076 17.22 west. Chambers Field adjoins NS Norfolk to the west, and is located directly north of and adjacent to the city of Norfolk, Virginia. The Naval Station is bordered by the Elizabeth River to the west and Willoughby Bay to the North. There are 490 acres within the Chambers Field boundary. The airfield elevation is 15 feet above sea level. Chambers Field has

generally level topography.

METHODS

An ecological study (see Federal Aviation Regulation 139.337 [Appendix A]) was undertaken to sample bird species and frequency, seasonal and behavioral activity, and bird locations in relation to the aircraft movement areas at Chambers Field. Birds were systematically randomly sampled two days per month for 12 consecutive months. Each sample day was comprised of four 45-minute observation periods starting at dawn, 09:30, 13:30, and 16:15. Each observation period had nine observation sites that allowed birds to be observed with the naked eye for five minutes. All birds seen were glassed with binoculars (10x24) to identify species, number, activity, and habitat type occupied. Habitat types were broken down into 16 different categories, all found at NS Norfolk. All bird species were recorded using the alpha species codes from the North American Bird Banding Manual.

Observation site numbers 4 through 7 were located on the airfield. The remaining five observation sites were located on the Naval Station at sites that were thought to be attractive to birds (Illustration 1). Observation site 1 was on the patrol road adjacent to Mason Creek, between the picnic area of Breezy Point Park and the approach end of runway 28. Observation site 2 was on the shoulder of Bellinger Boulevard approximately 100 yards west of the intersection of Bellinger Boulevard and 5th Avenue. Observation site 3 was in the parking lot adjacent to the Dragon Pad Heliport overlooking Willoughby Bay. Observation site 8 overlooked Willoughby Bay at the end of East Lagoon Avenue, adjacent to the NS Heliport. Observation site 9 was in the large parking lot across from the golf course at Vista Point.

Bird strike data was obtained from the Naval Safety Center in Norfolk, Virginia. Bird strike data was assembled and analyzed to determine details of strikes, including the bird species most frequently struck by aircraft.

Descriptive statistics were used to analyze the data. Tables and figures were used to describe the data. Scientific names of birds are listed in Appendix C. Bird - aircraft strikes reported at Chambers Field from 1981 - 1997 are listed in Appendix B.

RESULTS

Bird Abundance

A total of 50,309 birds were observed during the 12-month study. The number of birds seen fluctuated during the months of the survey, with the fewest number of birds observed in June (mean =225 birds/observation period) (Table 1, Figure 1). The greatest number of birds were observed in February (mean=829 birds/observation period) (Table 1, Figure 1). Fewer birds were observed during spring and summer than in the fall and winter.

Table 1. Number of birds observed each month at NS Norfolk from March 1998 - February 1999. Each month had two sample days comprised of four 45-minute observation periods per day.

Month	Total number of birds observed per month	Mean number of birds per 45-minute observation period
March	3,478	435
April	2,471	309
May	1,842	230
June	1,802	225
July	3,765	471
August	3,178	397
September	3,836	480
October	4,848	606
November	6,359	795
December	6,125	767
January	5,973	747
February	6,632	829
TOTAL	50,309	6,291

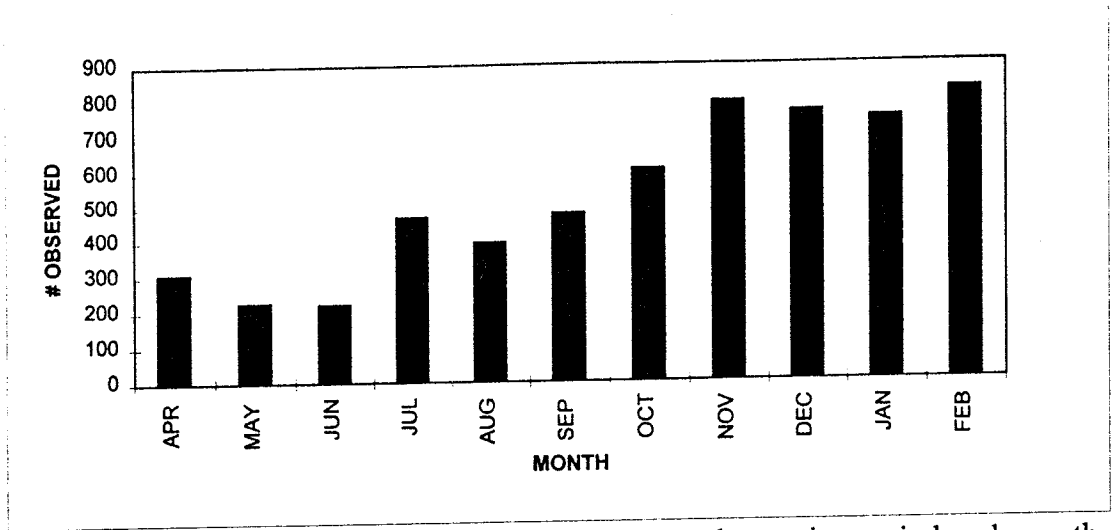

Figure 1. Mean number of birds seen per 45-minute observation period each month during the ecological study conducted at NS Norfolk March 1998 - February 1999.

The ten most numerous bird species observed during the ecological study comprised 90.6% of all birds observed at NS Norfolk from March 1998 through February 1999 (Table 2). The three most abundant groups of birds including all gull species, starlings, and crows accounted for 83% of the total number of birds observed.

Table 2. Mean number of the most abundant bird species observed per 45- minute observation period during the ecological study at NS Norfolk from March 1998 - February 1999.

Species	Mean number of birds observed	Rank
European starling	184	1
Ring-billed gull	112	2
American crow	69	3
Greater black-backed gull	37	4
Black skimmer	17	5
Laughing gull	16	6
Herring gull	15	7
Mallard duck	8	8
Double-crested cormorant	9	9
Bufflehead	6	10

European starlings were the most abundant species, and accounted for 35% of the total number of birds observed from March 1998 through February 1999. Eighty-four percent of all starling observations (n=17,670) were made from October through March (Figure 2). The fewest

starlings were observed in May (Figure 2).

Ring-billed gulls, greater black-backed gulls, laughing gulls, herring gulls, and unidentified gulls accounted for 35% of the total number of birds observed. Ring-billed gulls were the second most numerous species observed and comprised 61% of all gull observations (Table 2). Seventy-three percent (n=12,942) of all gull observations were made from September through February. There was a increase in ring-billed gull abundance during the winter (Figure3).

American crows accounted for 13% of all birds observed during the ecological study from March 1998 - February 1999. American crows were more abundant during fall and winter, with 87% of crows observed from October through March (Figure 2). There were increases in American crow abundance during July, November, and February (Figure 2).

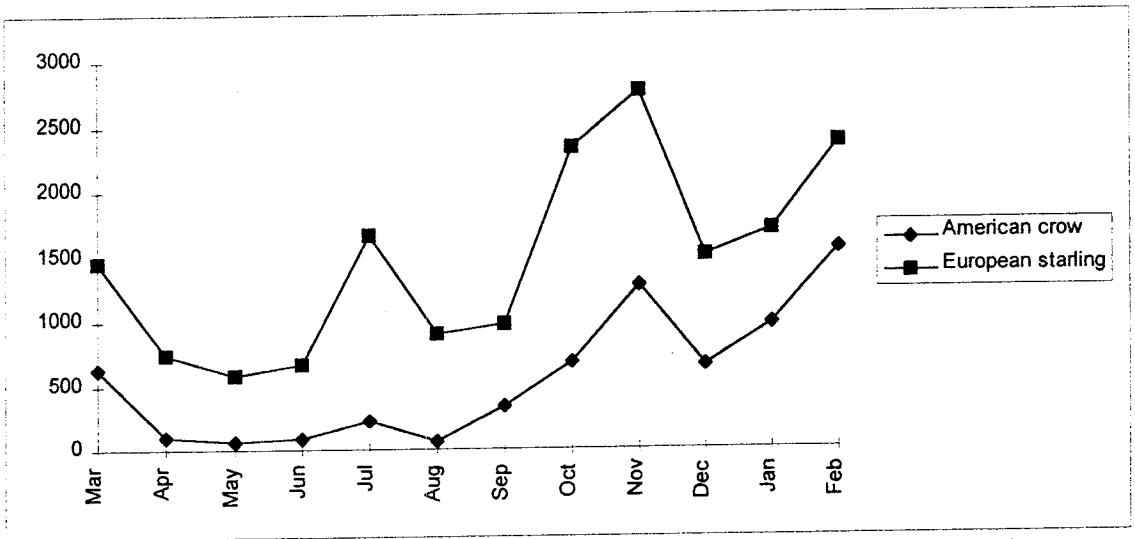

Figure 2. American crow and European starling observations at NS Norfolk from March 1998 - February 1999.

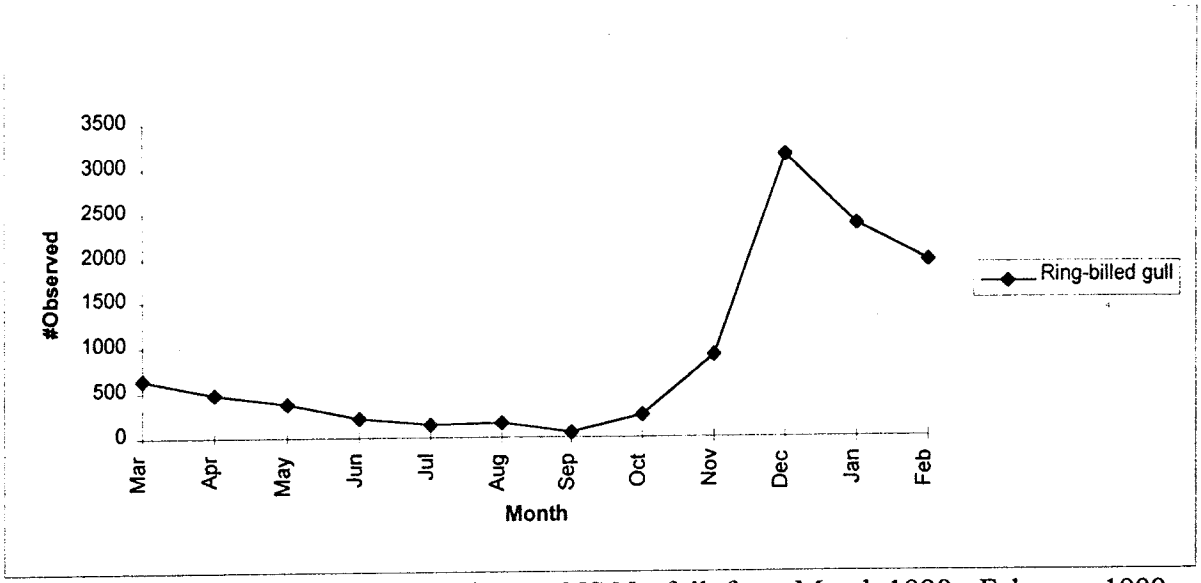

Figure 3. Ring-billed gull observations at NS Norfolk from March 1998 - February 1999.

Habitats Utilized

Birds were observed on 17 habitat types at NS Norfolk during the ecological study conducted from March 1998 - February 1999 (Table 3). Thirty-six percent of the total number of birds observed were seen on or over short grass (<12 inches). Fifteen percent of birds were observed on or over asphalt, and 14% were seen on or over shoreline. Observations of birds on or over taxiways and runways comprised eight percent of the total number of birds observed per habitat type (Table 3).

European starlings were observed in short grass in 71% of starling observations. Sixty-three percent of all the runway and taxiway observations involved starlings (n=2476). Sixty three percent of the total number of starlings observed were seen from observation points on the airfield. European starlings were observed using structures more frequently than other birds, with 9% of all starlings seen on or over structures.

Gulls were not as common as starlings on the airfield as only 9% of runway/taxiway observations involved gulls. Gulls made up 85% of shoreline and 44% of Willoughby Bay observations. Seventy percent of the gull observations were made at observation point 9 (Vista Point). Gulls frequently were observed on or over paved areas, 77% of the total number of observations in the asphalt habitat type involved gulls. Four percent of the total number of gulls

observed were on or over structures.

American crows were observed in or over woodland (roost) habitat more frequently than any other habitat type (41% of crow observations). Thirty-seven percent of crows observed were seen in or over short grass. Fifteen percent of all the crows observed were seen on or over the taxiways and runways. Seventy-six percent of the total number of crows observed were seen from observation points on the airfield.

A total of 82 Red-tailed hawk, Cooper's hawk, Northern harrier, and American kestrel observations were made from March 1998 through February 1999. The number observed does not rank hawks and falcons in the 10 most abundant species group; however, 89% of the hawk, harrier, and kestrel observations were on the airfield. Thirty-nine percent of hawk and kestrel observations were made on or over short grass.

Twenty two percent of the Canada goose observations were made from observation points on the airfield. The majority of Canada geese (72%) and the majority of mallards (70%) were observed at observation point 1 on Mason Creek.

Ninety nine percent of the black skimmer observations occurred at observation point 9 at Vista Point.

Table 3. Total number of birds observed on 17 habitat types at NS Norfolk during the ecological study conducted from March 1998 - February 1999.

Habitat type	# of birds observed	% of total observations
Asphalt	7514	15
Mason Creek	2133	4
Ditch	9	<1
Grass, >12 inches	16	<1
Grass, <12 inches	18315	36
Gravel area	128	<1
Marsh/wetland	78	<1
Pond	6	<1
Runway	1916	4
Shoreline	7125	14
Shrubs	398	1
Structure	2614	5
Taxiway	2018	4
Temporary standing water	300	1
Unpaved road	11	<1
Willoughby Bay	4330	9
Woodland	3398	7
Total	50,309	100

Time of Day

The total number of birds seen per observation period over the entire survey period remained relatively constant (Table 4). The observed number of gulls and starlings remained fairly constant throughout the day among the four observation periods. However, American crows were observed more frequently during period 4 than during other times of the day.

Table 4. Number of birds observed among four survey periods during the ecological study conducted at NS Norfolk from March 1998 - February 1999.

	Number of Birds Observed			
	Period 1	Period 2	Period 3	Period 4
Total	11624	13330	12590	12765
Percentage	23.1%	26.5%	25.0%	25.4%

Bird Activity

Birds were observed in 12 different activities (Table 5). Thirty-five percent of the total

number of birds observed were feeding, 35% were observed loafing, and 24% were observed flying locally.

Table 5. Percentage of birds observed in each major activity at NS Norfolk from March 1998-February 1999.

Species	Total observed	Activity (percentage) FD	FL	LF	SW
European starlings	17,670	63	30	6	0
Ring-billed gulls	10,732	11	11	75	2
American Crows	6,620	25	59	7	0
Greater black-backed gulls	3,544	3	5	81	11
Black skimmers	1,627	4	1	95	0
Laughing gulls	1,519	20	8	69	1
Herring gulls	1,465	16	11	64	9
Mallard ducks	907	42	8	33	18
Double-crested cormorants	896	51	40	1	7
Buffleheads	577	61	1	5	33

FD=feeding, FL=flying locally, LF=loafing, SW=swimming

Bird Strikes

Gulls, European starlings, Canada geese, hawks, and other bird species have been struck by aircraft at Chambers Field (Appendix B). Gulls comprised 40% (63 of 159 strikes) of bird-aircraft strikes at NS Norfolk from 1981 - 1997 (Table 6). Whereas, gulls were involved in 31% of all civil airport bird-aircraft strikes of known species reported in the United States from 1992 - 1996 (Cleary et al. 1997). Fifty percent of reported bird strikes at NS Norfolk from 1981 through 1997 involved unknown species. The remaining 12% of reported strikes involved various species, including; European starlings, sparrows, pigeons, mallard ducks, hawks, and Canada geese.

Table 6. Bird-aircraft strikes reported at NS Norfolk, 1981-1997.

Bird Species	# Strikes Recorded	Percent
Unknown	80	50
Gull	63	40
Pigeon	5	3
Starling	4	3
Sparrow	3	2
Canada goose	2	1
Hawk	1	<1
Mallard duck	1	<1

DISCUSSION

This study identified bird species and emphasized the need for management of specific bird species which are potentially problematic for Chambers Field. The local bird species of concern at Chambers field were identified as: gulls, starlings/blackbirds, crows, ducks/geese, and hawks/kestrels. Canada geese may have had greater importance in this study, however, 82 geese living on the airfield were removed in October, 1997. Birds were classified as species of concern for aviation based on their abundance, their occurrence in bird-aircraft strike records, and or their location in relation to aircraft operations.

Bird abundance was greatest during the winter months, decreased in the spring, and increased again throughout the summer and fall (Figure 1). The temporal variation for bird abundance in winter was due to immigrating migratory waterfowl and gulls. The lower numbers of birds observed in the spring consisted of the remaining local population of birds . The slow increase over the summer was the result of recruitment. The increase in bird abundance in late summer was the result of the immigrating migratory gulls, waterfowl, and shorebirds.

Gulls

Gulls were involved in 40% of reported bird strikes at Chambers Field from 1981 through 1997 (Naval Safety Center Data). Gulls present a hazard to aircraft due to their body size, flocking behavior, and frequent occurrence in the bird-aircraft strike record (Cleary et al. 1998, Seamans et al. 1995). Gulls were involved in 31% of all bird-aircraft strikes of known species at civil airports reported in the United States from 1992-1996. Additionally, gulls caused 16% of

damaging bird-aircraft strikes at civil airports (Cleary et al. 1997).

Ring-billed gulls, herring gulls, laughing gulls, and greater black-backed gulls were the most common species of gulls observed in the Chambers Field environment. Gulls were commonly found on the airfield due to their feeding habits and preference for flat, open areas to loaf. Gulls made up 35% of the total number of birds observed during the surveys from March 1998 to February 1999, with the largest number observed during December (Figure 3). The majority of gulls were observed loafing on the parking lot and sand beach at Vista Point (70% of gull observations were made at observation point 9). Gulls were more numerous on the airfield during winter. Airfield management personnel have reported large numbers of gulls on the airfield during rainy weather, when gulls were feeding on exposed earthworms.

Starlings and other blackbirds

European starlings and other closely related blackbirds (i.e. common grackles, brown-headed cowbirds, and red-winged blackbirds) pose a high risk to aircraft safety due to their flocking behavior and body density (Seamans et al. 1995). Starlings are "feathered bullets", having a body density 27% higher than herring gulls (Dolbeer 1997). One of the most serious aircraft collisions occurred in 1960 at Logan Airport in Boston, Massachusetts when an Electra aircraft hit a flock of European starlings and crashed, killing 62 people (Solman 1981).

Starlings were identified in four bird-aircraft strikes at Chambers Field from 1981 - 1997 (Table 6, Appendix B); however, there were over twenty strikes involving "small birds" and over twenty more strikes involving "birds" reported from 1981 - 1997. Many of the Naval Safety Center's descriptions of bird strikes at Chambers field mention large flocks of small birds. It is likely that European starlings and blackbirds account for many of these bird-aircraft strikes involving unidentified birds.

Blackbirds and starlings are common on Chambers Field due to their preference for flat, open areas to feed, rest, or stage/pre-roost. Sixty-three percent of the total number of starlings observed were seen from observation points on the airfield. Starlings accounted for 35% of the total number of birds observed during the ecological study from March 1998 through February 1999.

Crows

Crows occur on Chambers Field in large flocks, particularly during late afternoon through sunset as they return to roost sites at the airfield. In addition, crows loaf on the airfield in large numbers on some mornings before dispersing to feed. Seventy-six percent of all crows were seen from observation points on the airfield. The majority of crows were observed near the Red Label Area adjacent to taxiway Whiskey.

Crows present a hazard at Chambers field due to the large numbers (Table 2) that stage, loaf, and feed on and adjacent to the runway and taxiways. For example, on February 23, 1999 at 16:50, 519 crows were observed staging on the airfield near taxiway Whiskey. While individual crows, or small flocks of crows are not considered to be a serious threat to aviation because they appear infrequently in strike records, the large flock of crows at Chambers Field presents a hazard to aviation.

Waterfowl

Waterfowl (ducks and geese) comprise 12% of all bird-aircraft strikes and 16% of bird-aircraft strikes where civil aircraft were damaged (Cleary et al. 1997). No other bird species cause as many damaging bird-aircraft strikes as waterfowl, except gulls. For example, three Canada goose -aircraft strikes at airports near New York City resulted in over $15 million dollars in damage during 1995 (National Wildlife Research Center, Research Update, 1998). On September 14, 1995 a 757 aircraft struck 10 Canada geese at Dulles International Airport causing $1.7 million dollars in damage to the radome, both engines, and both wings (USDA 1999). On October 6, 1998, 10 Canada geese struck a C12 Gulfstream twin engine propeller plane at Fort Belvoir causing $300,000 dollars in damage to one engine (USDA 1999). Geese have been reported as struck by aircraft at Chambers Field on September 25, 1992, and August 18, 1997 (Appendix B). A mallard duck was struck at Chambers Field on April 6, 1984.

Canada geese are one of the more dangerous bird species for aircraft to strike because of their large size (8-12 pounds) and because they travel in flocks of up to several hundred birds. Non-migratory (resident) Canada geese presence on and around airports creates a threat to aviation and human safety. There is a very strong relationship between bird weight and the probability of plane damage (Anonymous 1992). For example, there is a 90% probability of

plane damage when the bird weighs 70 or more ounces (4 1/3 pounds) verses a 50% probability of plane damage for a 6 ounce (1/3 pound) bird (Anonymous 1992).

Resident Canada geese have also been involved in aircraft strikes at Dulles International Airport, Ronald Reagan National Airport, Norfolk International Airport, Roanoke Regional Airport, and Fort Belvoir in Virginia. Some of these resident Canada goose- aircraft strikes resulted in costly plane repairs, and aborted take-offs and landings.

Military bases in Virginia have expressed concern about resident Canada geese on airfields since a Canada goose-aircraft strike at Elmendorf Air Force Base in 1995 resulted in the death of 24 Air Force personnel because the plane ingested Canada geese into two engines and crashed on takeoff. Langley Air Force Base and NS Norfolk have altered, delayed, aborted, and ceased flight operations because of Canada geese on their airfield.

The North American resident Canada goose population tripled to 1.8 million birds from 1985 - 1995 (Dolbeer 1997). The resident Canada goose population in Virginia increased from 66,000 in 1991 to 301,000 in 1998 (VA Dept. of Game and Inland Fisheries, unpublished data and USDA 1999).

Hawks and kestrels

Red- tailed hawks, Cooper's hawks, Northern harriers, and American kestrels were present on Chambers Field during the ecological study. Eighty-nine percent of the total number of hawks and kestrels observed were on the airfield. These birds become active during mid-morning and remain active until late afternoon. American kestrels were commonly seen perched and hunting near the approach end of runway 10. Red-tailed hawks, Cooper's hawks, and Northern harriers were often seen hunting over tall grass and shrub areas, or perched in trees adjacent to the Red Label Area.

Hawks and kestrels are hazardous to aircraft due to their size and intense focus when hunting which makes them oblivious to aircraft operations. A co-pilot was injured at 11:00, September 30, 1992 when a hawk flew into the windscreen of an aircraft at Chambers Field (Appendix B). Even small birds can be dangerous to aircraft. For example, a kestrel which weighs 4 oz caused an engine shutdown on a B-737 at Nashville, TN in July 1996. This plane aborted take-off, slid off the runway and injured 3 passengers (Dolbeer 1997).

MANAGEMENT RECOMMENDATIONS

Management recommendations are presented as alternatives. Each alternative was developed to alleviate wildlife situations that affect air traffic and human safety. Alternatives include an analysis of expected benefits. Benefits are expressed as expected changes in bird abundance. NS Norfolk should consider implementing a combination of alternatives to address several wildlife issues and increase the effectiveness of the BASH program. The alternatives are not mutually exclusive.

Recommendations in this section are suggested to reduce hazards to air operations. Airfield Management can implement these recommendations with station personnel, a private wildlife management company, or through USDA-APHIS-WS. All actions to remove birds need to be coordinated with Natural Resources.

1: Harass birds, reinforcing with live ammunition

Bird populations on and around the runways need to be frequently harassed (especially the identified species of concern). When birds are present on the airfield in large numbers, such as crows and gulls, harassment with pyrotechnics needs to be reinforced with live ammunition if birds are reluctant to disperse. Harassment should be focused whenever birds pose an immediate threat to aircraft operations.

Propane cannons can be utilized on the airfield, with at least one cannon at the approach end, mid-field, and departure end of runway 10/28. Birds rapidly habituate to propane cannons, therefore, birds must be harassed and occasionally shot for propane cannons to remain effective. Also, propane cannons must be moved regularly to different locations around the airfield to prevent habituation Harassment supplemented by shooting a few birds increases the effectiveness of both pyrotechnics and propane cannons (Godin 1994).

The designated members of the Bird Detection and Dispersal Team (BDDT) must participate aggressively to make the effort worthwhile. The crew must consist of highly motivated and dedicated personnel. Adequate equipment such as vehicles, shotguns, and pyrotechnics should be available for immediate use. Harassment, reinforced by shooting, if consistently implemented, would be expected to reduce the abundance of birds of concern at

Chambers Field.

2. Manage gull presence on the airfield

Do not allow gulls to establish a habit of using the airfield to feed, breed, or loaf. Gulls, geese, crows, and starlings prefer short grass less than 6 inches tall (Godin 1989). Maintenance of grass height between 6 and 12 inches is critical in reduction of gull numbers because taller grass discourages feeding and loafing. Even with this in effect, gulls may inhabit the airfield, particularly during inclement weather. Persistent harassment using pyrotechnics and species specific bioacoustics (i.e., recorded distress calls and sirens) is necessary to discourage these birds. Shooting some gulls to reinforce harassment methods may be required. Other techniques such as propane cannons should be considered.

Feeding of gulls and all wildlife should be discouraged at NS Norfolk . Signs that discourage feeding should be posted at Breezy Point Park and Vista Point. All trash receptacles should be tightly covered to prevent birds from feeding on the garbage.

The expected benefit of managing gull presence on Chambers Field is the reduction of risk associated with large numbers of gulls on the airfield.

3. Manage blackbird and European starling numbers on the airfield

Blackbirds and European starlings prefer short grass less than 6 inches tall. Short grass permits birds clear sight distances, visual intra-specific communication, and allows access to insects, seeds, and invertebrates. Maintenance of grass height between 7 and 14 inches is the best method of reducing airfield blackbird and starling numbers.

European starlings feed on seeds and insects in areas of short grass (Johnson and Glahn 1994). Insects such as Coleoptera and Lepidoptera lawn grubs, could be reduced by spraying insecticides on grass areas within the airfield. The application of insecticides on the airfield would be expected to reduce insect abundance. The expected benefit of the reduction in insects, e.g. grubs, would be a decrease in the number of starlings feeding on the airfield.

Blackbirds and starlings respond well to an intense frightening program using bioacoustics (i.e., recorded distress calls and sirens), pyrotechnics, and shooting. Starlings and

blackbirds are not federally protected and may be removed without permits when they are committing or about to commit damage (50 Code of Federal Regulations part 21.43). Occasional shooting of birds will reinforce other frightening techniques. Removing birds with registered toxicants or Australian crow traps may also be considered.

The expected benefit of managing blackbirds and European starlings at Chambers Field is the reduction in risk associated with large numbers of birds on the airfield.

4: Manage the American crow population

There is an active crow roost located in the pine trees near the weapons area, behind Taxiway Whiskey. The majority of crow observations were made near the Red Label Area adjacent to Taxiway Whiskey. The towers view of this area is partially blocked by trees along taxiway Whiskey. It is important that the BDDT patrol this area to harass birds. Removal of the crow roost or thinning of the roost trees is recommended. Bioacoustics, pyrotechnics, and lethal methods can be used to frighten and remove these birds. The expected benefit of this alternative is the reduction of risk associated with large numbers of crows on the runways and taxiways.

5: Manage the Canada Goose and duck populations

On September 26-27 1997, and October 3, 1997, USDA Wildlife Services removed 82 Canada geese from the airfield. The Canada geese presented a threat to air operations by feeding and loafing on the airfield. Canada geese have not been reported on the airfield in large numbers since the removal, however, airfield management is concerned about future problems with Canada geese.

Canada goose management at NS Norfolk can be accomplished through several alternatives including population reduction, harassment, and habitat alteration. Population reduction can be achieved by removing geese and oiling eggs. Geese could be removed by shooting, captured with the drug Alpha Chloralose (with Wildlife Services assistance), or rounded-up during the summer molt (with Wildlife Services assistance). The round-up involves capturing and putting geese into crates while in the flightless condition. The rounded-up geese would be donated to a food for the hungry program.

Eggs of Canada geese nesting on NS Norfolk should be oiled with corn oil during March and April to reduce recruitment into the local population. A letter of approval from the Virginia Department of Game and Inland Fisheries is required.

Canada geese feeding or loafing on the airfield should be harassed with 15mm pyrotechnics (e.g. screamers and bird bombs). Geese loafing or feeding at Breezy Point Park and Sewell's Point Golf Course should also be harassed to the extent possible. If geese fail to respond to harassment, shooting a goose in the flock will reinforce harassment and fear of humans.

Signs that discourage the feeding of geese and other wildlife should be posted at Breezy Point Park to deter the public from feeding the geese.

There is a group of feral ducks (10-20) living on Mason Creek, adjacent to the approach end of Runway 28. Removal of feral ducks and geese may reduce the attraction of these areas to passing waterfowl. During the ecological study, people were observed feeding these ducks at Breezy Point Park and the residential areas around Mason Creek. These ducks may attract other waterfowl into the approach path of aircraft using Runway 28.

The benefits of managing the resident ducks and Canada geese at NS Norfolk include the reduction of risks to: aircraft operations, human health and safety, and the reduction of damage to turf areas from excessive grazing and droppings.

6. Manage hawks and kestrels on the airfield

There are large areas of tall grass, shrubs, and woodland within the airfield that provide, roosting, perching, and feeding habitat for birds of prey. The tall and short grass areas adjacent to shrubs and woodland present an ideal habitat for birds of prey such as Red-tailed hawks, Northern harriers, and American kestrels. A reduction in the abundance of available perching sites by thinning or removing dead trees may decrease the attractiveness of the airfield to hawks and falcons. Isolated live trees routinely used by hawks and kestrels for perching should be considered for removal. Reducing tall grass (>14 inches tall)and shrub areas may help reduce the abundance of small mammals (e.g. meadow voles) on the airfield. Attempts can be made to frighten hawks and kestrels from the airfield, however hawks and falcons are not easily

discouraged by harassment.

7. Additional habitat alteration recommendations

Creeks, ponds, lakes, drainage ditches, etc., surrounding Chambers field are an attraction to waterfowl, particularly if these areas contain emergent or submerged vegetation for feeding, nesting, or shelter. In addition, temporary standing water on the airfield provides an attraction to waterfowl and other birds. When possible, drain water sources and level areas to prevent standing water.

Vegetation that has grown up through Taxiway Alpha and other paved areas on the airfield should be removed. This vegetation provides nesting and feeding cover for ground nesting birds.

Starlings, pigeons, and house sparrows often roost and nest within structures. Roosting and nesting areas within buildings and hangers should be identified and offending birds should be removed and excluded from the structures. Trapping, shooting, and toxicants are available methods. Birds can be safely shot in hangers with a high quality air rifle. One benefit of removing birds from structures would be a reduction in the populations of starlings, pigeons, and house sparrows using the airfield. Additional benefits include the reduction in necessary maintenance to equipment and human health concerns associated with bird droppings.

8. Improve bird-aircraft strike reporting at Chambers Field

The bird strikes appear to be reported irregularly at Chambers Field. It is in Chambers Field's interest to insure that all bird-aircraft strikes are reported and recorded with as much detail and accuracy possible. Copies of the strike record should be kept by Natural Resources and Airfield Management for reference and discussion at BHWG meetings. Flight squadrons, Fire Rescue personnel, and individuals who participate in FOD sweeps of runways, heliports, and taxiways should be briefed on the importance of saving bird remains.

More effort should be made to identify bird remains to the species level. Fifty percent of reported bird strikes at NS Norfolk from 1981 through 1997 involved unknown species. Out of 63 bird - aircraft strikes involving gulls, only one strike report identified the species of gull

(herring gull). The benefits of keeping detailed, accurate strike records include the ability to identify specific hazards and trends associated with individual bird species and to direct management efforts at those species.

9: Implement a BASH plan for Chambers Field.

Routinely hold Bird Hazard Working Group (BHWG) meetings to develop an effective pro-active program. Continue to monitor the bird populations at NS Norfolk to help identify risks. The benefit of this alternative would be a coordinated effort from all involved parties to effectively reduce the hazards wildlife pose to human health, safety, and aviation at Chambers Field.

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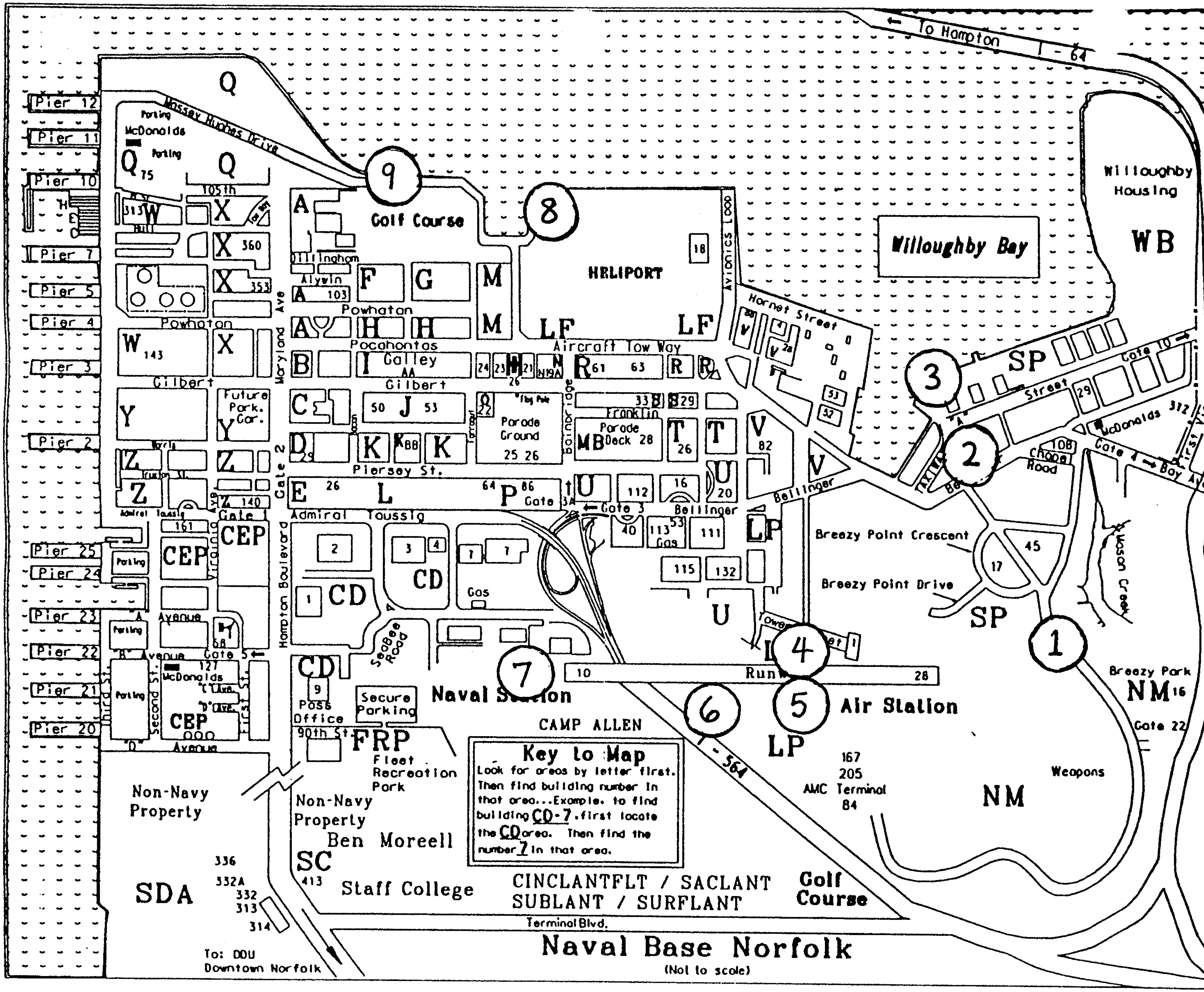
ILLUSTRATION 1

BIRD SURVEY OBSERVATION SITES DURING
ECOLOGICAL STUDY AT NAS NORFOLK
March 1998 - February 1999


Naval Base Norfolk
(Not to scale)
Key to Map
Look for areas by letter first. Then find building number in that area...Example, to find building CD-7, first locate the CD area. Then find the number 7 in that area.
To Hampton I-64
Willoughby Bay
Willoughby Housing
WB
HELIPORT
Golf Course
Naval Station
Air Station
CAMP ALLEN
Runway
I-564
Weapons
Breezy Park
Gate 22
Mason Creek
Breezy Point Crescent
Breezy Point Drive
AMC Terminal
Fleet Recreation Park
Secure Parking
Post Office
Non-Navy Property
Ben Moreell
Staff College
CINCLANTFLT / SACLANT
SUBLANT / SURFLANT
Terminal Blvd.
To: DOU Downtown Norfolk
Pier 12
Pier 11
Pier 10
Pier 7
Pier 5
Pier 4
Pier 3
Pier 2
Pier 25
Pier 24
Pier 23
Pier 22
Pier 21
Pier 20
Massey Hughes Drive
Hampton Boulevard
Maryland Ave
Admiral Taussig
Piersey St.
Gilbert
Pocahontas
Powhatan
Aircraft Tow Way
Avionics Loop
Hornet Street
Bellinger
Franklin
Parade Ground
Parade Deck
Gate 2
Gate 3
Gate 4
Gate 5
Gate 10
McDonalds
Chapel Road
Bay Ave
Future Park. Gar.
SeaBee Road
90th St.
105th
Gas

APPENDIX A

FEDERAL AVIATION ADMINISTRATION
REGULATION 139.337

under the plan are familiar with their assignments and are properly trained;

(4) At least once every 12 months, review the plan with all of the parties with whom the plan is coordinated as specified in paragraph (g)(1) of this section, to ensure that all parties know their responsibilities and that all of the information in the plan is current; and

(5) Hold a full-scale airport emergency plan exercise at least once every 3 years.

(h) FAA Advisory Circulars in the 150 Series contain standards and procedures for the development of an airport emergency plan which are acceptable to the Administrator.

[52 FR 44282, Nov. 18, 1987; 53 FR 4258, Feb. 12, 1988]

§ 139.327 Self-inspection program.

(a) Each certificate holder shall inspect the airport to assure compliance with this subpart—

(1) Daily, except as otherwise required by the airport certification manual or airport certification specifications;

(2) When required by any unusual condition such as construction activities or meteorological conditions that may affect safe air carrier operations; and

(3) Immediately after an accident or incident.

(b) Each certificate holder shall provide the following:

(1) Equipment for use in conducting safety inspections of the airport;

(2) Procedures, facilities, and equipment for reliable and rapid dissemination of information between airport personnel and its air carriers;

(3) Procedures to ensure that qualified inspection personnel perform the inspections; and

(4) A reporting system to ensure prompt correction of unsafe airport conditions noted during the inspection.

(c) Ea[illegible] certificate holder shall prepare and keep for at least 6 months, and make available for inspection by the Administrator on request, a record of each inspection prescribed by this section, showing the conditions found

(d) FAA Advisory Circulars in the 150 series contain standards and procedures for the conduct of airport self-inspections which are acceptable to the Administrator.

[52 FR 44282, Nov. 18, 1987; 53 FR 4120, Feb. 12, 1988]

§ 139.329 Ground vehicles.

Each certificate holder shall—

(a) Limit access to movement areas and safety areas only to those ground vehicles necessary for airport operations;

(b) Establish and implement procedures for the safe and orderly access to, and operation on, the movement area and safety areas by ground vehicles, including provisions identifying the consequences of noncompliance with the procedures by an employee, tenant, or contractor;

(c) When an air traffic control tower is in operation, ensure that each ground vehicle operating on the movement area is controlled by one of the following:

(1) Two-way radio communications between each vehicle and the tower,

(2) An escort vehicle with two-way radio communications with the tower to accompany any vehicle without a radio, or

(3) Measures acceptable to the Administrator for controlling vehicles, such as signs, signals, or guards, when it is not operationally practical to have two-way radio communications with the vehicle or an escort vehicle;

(d) When an air traffic control tower is not in operation, provide adequate procedures to control ground vehicles on the movement area through prearranged signs or signals;

(e) Ensure that each employee, tenant, or contractor who operates a ground vehicle on any portion of the airport that has access to the movement area is familiar with the airport's procedures for the operation of ground vehicles and the consequences of noncompliance; and

(f) On request by the Administrator, make available for inspection any record of accidents or incidents on the movement areas involving air carrier aircraft and/or ground vehicles.

[Doc. No. 24812, 52 FR 44282, Nov. 18, 1987, as amended by Amdt. 139-17, 55 FR 48214, Nov. 19, 1990]

§ 139.331 Obstructions.

Each certificate holder shall ensure that each object in each area within its authority which exceeds any of the heights or penetrates the imaginary surfaces described in part 77 of this chapter is either removed, marked, or lighted. However, removal, marking, and lighting is not required if it is determined to be unnecessary by an FAA aeronautical study.

§ 139.333 Protection of navaids.

Each certificate holder shall—

(a) Prevent the construction of facilities on its airport that, as determined by the Administrator, would derogate the operation of an electronic or visual navaid and air traffic control facilities on the airport;

(b) Protect, or if the owner is other than the certificate holder, assist in protecting, all navaids on its airport against vandalism and theft; and

(c) Prevent, insofar as it is within the airport's authority, interruption of visual and electronic signals of navaids.

§ 139.335 Public protection.

(a) Each certificate holder shall provide—

(1) Safeguards acceptable to the Administrator to prevent inadvertent entry to the movement area by unauthorized persons or vehicles; and

(2) Reasonable protection of persons and property from aircraft blast.

(b) Fencing meeting the requirements of part 107 of this chapter in areas subject to that part is acceptable for meeting the requirements of paragraph (a)(1) of this section.

§ 139.337 Wildlife hazard management.

(a) Each certificate holder shall provide for the conduct of an ecological study, acceptable to the Administrator, when any of the following events occurs on or near the airport:

(1) An air carrier aircraft experiences a multiple bird strike or engine ingestion.

(2) An air carrier aircraft experiences a damaging collision with wildlife other than birds.

(3) Wildlife of a size or in numbers capable of causing an event described in paragraph (a) (1) or (2) of this section is observed to have access to any airport flight pattern or movement area.

(b) The study required in paragraph (a) of this section shall contain at least the following:

(1) Analysis of the event which prompted the study.

(2) Identification of the species, numbers, locations, local movements, and daily and seasonal occurrences of wildlife observed.

(3) Identification and location of features on and near the airport that attract wildlife.

(4) Description of the wildlife hazard to air carrier operations.

(c) The study required by paragraph (a) of this section shall be submitted to the Administrator, who determines whether or not there is a need for a wildlife hazard management plan. In reaching this determination, the Administrator considers—

(1) The ecological study;

(2) The aeronautical activity at the airport;

(3) The views of the certificate holder;

(4) The views of the airport users; and

(5) Any other factors bearing on the matter of which the Administrator is aware.

(d) When the Administrator determines that a wildlife hazard management plan is needed, the certificate holder shall formulate and implement a plan using the ecological study as a basis. The plan shall—

(1) Be submitted to, and approved by, the Administrator prior to implementation; and

(2) Provide measures to alleviate or eliminate wildlife hazards to air carrier operations.

(e) The plan shall include at least the following:

(1) The persons who have authority and responsibility for implementing the plan.

(2) Priorities for needed habitat modification and changes in land use

identified in the ecological study, with target dates for completion.

(3) Requirements for and, where applicable, copies of local, state, and Federal wildlife control permits.

(4) Identification of resources to be provided by the certificate holder for implementation of the plan.

(5) Procedures to be followed during air carrier operations, including at least—

(i) Assignment of personnel responsibilities for implementing the procedures;

(ii) Conduct of physical inspections of the movement area and other areas critical to wildlife hazard management sufficiently in advance of air carrier operations to allow time for wildlife controls to be effective;

(iii) Wildlife control measures; and

(iv) Communication between the wildlife control personnel and any air traffic control tower in operation at the airport.

(6) Periodic evaluation and review of the wildlife hazard management plan for—

(i) Effectiveness in dealing with the wildlife hazard; and

(ii) Indications that the existence of the wildlife hazard, as previously described in the ecological study, should be reevaluated.

(7) A training program to provide airport personnel with the knowledge and skills needed to carry out the wildlife hazard management plan required by paragraph (d) of this section.

(f) Notwithstanding the other requirements of this section, each certificate holder shall take immediate measures to alleviate wildlife hazards whenever they are detected.

(g) FAA Advisory Circulars in the 150 series contain standards and procedures for wildlife hazard management at airports which are acceptable to the Administrator.

§ 139.339 Airport condition reporting.

(a) Each certificate holder shall provide for the collection and dissemination of airport condition information to air carriers.

(b) In complying with paragraph (a) of this section, the certificate holder shall utilize the NOTAM system and, as appropriate, other systems and procedures acceptable to the Administrator.

(c) In complying with paragraph (a) of this section, the certificate holder shall provide information on the following airport conditions which may affect the safe operations of air carriers:

(1) Construction or maintenance activity on movement areas, safety areas, or loading ramps and parking areas.

(2) Surface irregularities on movement areas or loading ramps and parking areas.

(3) Snow, ice, slush, or water on the movement area or loading ramps and parking areas.

(4) Snow piled or drifted on or near movement areas contrary to § 139.313.

(5) Objects on the movement area or safety areas contrary to § 139.309.

(6) Malfunction of any lighting system required by § 139.311.

(7) Unresolved wildlife hazards as identified in accordance with § 139.337.

(8) Nonavailability of any rescue and firefighting capability required in §§ 139.317 and 139.319.

(9) Any other condition as specified in the airport certification manual or airport certification specifications, or which may otherwise adversely affect the safe operations of air carriers.

(d) FAA Advisory Circulars in the 150 series contain standards and procedures for using the NOTAM system for dissemination of airport information which are acceptable to the Administrator.

[52 FR 44282, Nov. 18, 1987; 53 FR 4258, Feb. 12, 1988]

§ 139.341 Identifying, marking, and reporting construction and other unserviceable areas.

(a) Each certificate holder shall—

(1) Mark and, if appropriate, light in a manner acceptable to the Administrator—

(i) Each construction area and unserviceable area which is on or adjacent to any movement area or any other area of the airport on which air carrier aircraft may be operated;

(ii) Each item of construction equipment and each construction roadway, which may affect the safe movement of aircraft on the airport; and

(iii) Any area adjacent to a navaid that, if traversed, could cause derogation of the signal or the failure of the navaid, and

(2) Provide procedures, such as a review of all appropriate utility plans prior to construction, for avoiding damage to existing utilities, cables, wires, conduits, pipelines, or other underground facilities.

(b) FAA Advisory Circulars in the 150 series contain standards and procedures for identifying and marking construction areas which are acceptable to the Administrator.

§ 139.343 Noncomplying conditions.

Unless otherwise authorized by the Administrator, whenever the requirements of subpart D of this part cannot be met to the extent that uncorrected unsafe conditions exist on the airport, the certificate holder shall limit air carrier operations to those portions of the airport not rendered unsafe by those conditions.

APPENDIX B
CHAMBERS FIELD BIRD - AIRCRAFT STRIKES
1981 - 1997

DATE	TIME	BIRD	RUNWAY
3/13/81	3:00:00 PM	GULL	28
5/14/81	10:00:00 PM	GULL	
7/11/81	7:00:00 PM	UN	10
10/25/81	6:00:00 PM	GULL	28
11/3/81	12:00:00 PM	PIGEON	10
1/23/82	3:00:00 PM	GULL	28
7/11/82	5:00:00 PM	UN	
7/30/82	12:00:00 PM	UN	
8/8/82	6:00:00 PM	GULL	
9/16/82	9:00:00 PM	UN	
1/31/83	3:00:00 PM	GULL	27R
3/7/83	8:00:00 AM	GULL	
9/9/83	3:00:00 PM	GULL	
9/14/83	8:00:00 AM	GULL	10
10/6/83	10:00:00 PM	UN	01
1/10/84	10:00:00 AM	GULL	10
1/24/84		UN	
2/13/84	6:00:00 AM	UN	28
4/6/84	10:00:00 AM	MALLARD	28
5/2/84	1:00:00 PM	GULL	28
5/11/84	10:00:00 PM	UN	10
8/8/84	4:00:00 PM	UN	
8/14/84	7:00:00 AM	GULL	10
8/20/84	7:00:00 AM	GULL	28
9/10/84	7:00:00 PM	GULL	
9/14/84	9:00:00 AM	GULL	10
10/2/84	10:00:00 PM	UN	
11/14/84	1:00:00 PM	UN	01
11/20/84	10:00:00 AM	STARLING	
2/6/85	7:00:00 PM	GULL	10
2/19/85	1:00:00 AM	UN	10
2/19/85	5:00:00 PM	GULL	28
4/5/85	11:00:00 AM	GULL	27
4/28/85	5:00:00 PM	UN	10
5/14/85	11:00:00 AM	GULL	
7/31/85		UN	28
9/5/85	12:00:00 PM	UN	
9/5/85	10:00:00 AM	GULL	
9/15/85	10:00:00 AM	GULL	
11/6/85	8:00:00 PM	UN	
11/15/85	9:00:00 PM	UN	
11/21/85		GULL	
12/30/85	3:00:00 PM	GULL	
1/13/86	5:00:00 PM	UN	
2/23/86	1:00:00 PM	GULL	
3/28/86	1:00:00 PM	PIGEON	10
4/17/86	8:00:00 PM	GULL	27R
4/24/86	8:00:00 PM	UN	
5/14/86	7:00:00 PM	GULL	
7/6/86	4:00:00 PM	UN	

DATE	TIME	BIRD	RUNWAY
8/13/86	10:00:00 PM	BAT	10
8/25/86	1:00:00 PM	UN	
9/6/86		BAT	
10/25/86	5:00:00 PM	GULL	
10/31/86	9:00:00 PM	UN	
11/4/86	6:00:00 PM	UN	
4/8/87	8:00:00 PM	UN	
7/11/87	6:00:00 PM	UN	10
8/13/87	12:00:00 PM	STARLING	28
7/28/88	6:00:00 PM	UN	
8/9/88	3:00:00 PM	GULL	
8/10/88	9:00:00 PM	BAT	
8/22/88	8:00:00 AM	UN	10
1/17/89	3:00:00 PM	GULL	4
3/29/89		UN	
3/31/89		UN	
4/21/89		UN	
5/1/89	9:00:00 PM	UN	
5/21/89		UN	
6/8/89		UN	
6/20/89		UN	
7/3/89		GULL	
7/5/89		UN	
7/6/89	12:00:00 PM	UN	19R
8/4/89	3:00:00 PM	GULL	
8/31/89		GULL	
9/19/89		STARLING	
10/12/89		UN	
10/26/89		PIGEON	
10/27/89		STARLING	
10/31/89		GULL	
11/3/89		GULL	
11/29/89		UN	
11/29/89		GULL	
12/3/89		GULL	
12/28/89		UN	
1/22/90		GULL	
2/22/90		GULL	
3/13/90		UN	
4/29/90		GULL	
4/30/90		GULL	
5/12/90		UN	
5/13/90		UN	
7/25/90		UN	
7/30/90		GULL	
8/7/90		UN	
8/30/90	8:00:00 AM	GULL	
9/26/90		UN	
10/3/90		UN	
10/14/90		UN	

DATE	TIME	BIRD	RUNWAY
10/15/90		UN	
12/26/90		PIGEON	
2/6/91		PIGEON	
2/7/91	11:00:00 AM	GULL	28
2/19/91	11:00:00 PM	UN	
4/28/91		UN	
4/30/91		UN	
5/29/91		UN	
6/29/91	4:00:00 PM	UN	01
8/2/91	8:00:00 AM	UN	28
8/5/91	5:00:00 PM	GULL	10
8/14/91	10:00:00 AM	UN	17
8/19/91	12:00:00 PM	UN	28
8/22/91	6:00:00 PM	GULL	10
10/8/91		UN	
1/15/92	3:00:00 PM	GULL	
4/5/92	5:00:00 PM	UN	10
8/11/92	3:00:00 PM	GULL	22R
8/18/92	8:00:00 PM	UN	
8/30/92	1:00:00 PM	UN	
9/13/92	6:00:00 PM	UN	
9/25/92		GOOSE	
9/30/92	8:00:00 PM	UN	
9/30/92	11:00:00 AM	HAWK	
10/3/92		GULL	
10/6/92		UN	
10/14/92	8:00:00 PM	SPARROW	
11/3/92	12:00:00 AM	UN	
11/12/92	9:00:00 PM	GULL	27R
12/15/92	11:00:00 AM	GULL	
3/27/93	6:00:00 PM	GULL	28
6/7/93	10:00:00 AM	SPARROW	28
6/24/93	12:00:00 PM	SPARROW	10
8/18/93	10:00:00 AM	GULL	
9/9/93		UN	
9/16/93	8:00:00 PM	GULL	
11/17/93	11:00:00 AM	UN	28
4/29/94		UN	
6/23/94	7:00:00 PM	UN	28
7/21/94	3:00:00 PM	GULL	28
10/17/94		GULL	
11/1/94	10:00:00 AM	GULL	28
11/17/94		GULL	
3/13/95		UN	
4/5/95		GULL	
7/20/95	8:00:00 AM	UN	
7/23/95	12:00:00 AM	UN	28
9/14/95	5:00:00 PM	GULL	27
10/2/95		UN	
10/31/95	10:00:00 PM	UN	

BIRD STRIKES

DATE	TIME	BIRD	RUNWAY
5/12/96	3:00:00 PM	GULL	
6/21/96	1:00:00 PM	UN	27R
7/1/96	9:00:00 PM	GULL	10
7/30/96	8:00:00 AM	UN	10
9/19/96		UN	
10/6/96		UN	
10/29/96	9:00:00 PM	UN	
3/17/97	11:00:00 PM	GULL	
8/17/97	8:00:00 PM	GOOSE	28
11/5/97		UN	28
11/10/97		GULL	
11/15/97	1:00:00 PM	UN	

APPENDIX C

BIRD SPECIES OBSERVED DURING SURVEYS
MARCH 1998-FEBRUARY 1999

American coot (Fulica americana)
American crow (Corvus brachynchos)
American kestrel (Falco sparverius)
American robin (Turdus migratorius)
American widgeon (Anas americana)
Barn swallow (Hirundo rustica)
Black- bellied plover (Pluvialis squatarola)
Belted kingfisher (Megaceryle alcyon)
Blue jay (Cyanocitta cristata)
Black skimmer (Rynchops niger)
Brant (Branta bernicla)
Brown pelican (Pelecanus occidentalis)
Boat-tailed grackle (Quiscalus major)
Bufflehead (Bucephala albeola)
Canada goose (Branta canadensis)
California gull (Larus californicus)
Canvasback (Aythya valisineria)
Caspian tern (Sterna caspia)
Common grackle (Quiscalus quiscula)
Cooper's hawk (Accipiter cooperii)
Common loon (Gavia immer)
Common tern (Sterna hirundo)
Double- crested cormorant
(Phalacrocorax auritus)
Eastern kingbird (Tyrannus tyrannus)
Eastern meadowlark (Sturnella magna)
European starling (Sturnus vulgaris)
Field sparrow (Spizella pusilla)
Greater black-backed gull (Larus marinus)
Great blue heron (Ardea herodias)
Gull-billed tern (Gelochelidon nilotica)
Great egret (Casmerodius albus)
Greater scaup (Aythya marila)
Herring gull (Larus argentatus)
Horned lark (Eremophila alpestris)
Hooded merganser (Lophodytes cucullatus)
Kill deer (Charadrius vociferus)
Laughing gull (Larus atricilla)
Little tern (Sterna albifrons)
Mallard (Anas platyrhynchos)
Morning dove (Zenaida macroura)
Northern bobwhite (Colinus virginianus)
Northern harrier (Circus cyaneus)
Northern mockingbird (Mimus polyglottos)
Osprey (Pandion haliaetus)
Pied-billed grebe (Podilymbus podiceps)
Red-necked grebe (Podiceps grisegena)
Ring-billed gull (Larus delawarensis)
Red-breasted merganser (Mergus serrator)
Rock dove (Columba livia)
Royal tern (Sterna maxima)
Red tailed hawk (Buteo jamaicensis)
Ruddy duck (Oxyura jamaicensis)
Ruddy turnstone (Arenaria interpres)
Red-winged blackbird (Agelaius phoniceus)
Sanderling (Calidris alba)
Savannah sparrow (P. sandwichensis)
Turkey vulture (Cathartes aura)
Upland sandpiper (Bartramia longicauda)
Yellow- crowned night heron (Nyctanassa
violacea)
Yellow-shafted flicker (Colaptes auratus)

APPENDIX A

BASH SELF-INSPECTION CHECKLIST

1. Is the BASH PLAN current and readily accessible for your reference?

2. Are changes and annual reviews posted to the plan?

3. Are all members of the BHWG familiar with their responsibilities as delegated in the BASH Plan?

4. Does the BHWG meet quarterly and do all members attend the meetings?

5. Are BASH topics included in flight safety briefings?

6. Are posters , pictures, maps, etc., related to BASH posted in the aircrew briefing areas , safety bulletin boards, and base operations flight planning areas?

7. Are both damaging and non-damaging bird strikes recorded?

8. Are all damaging and non-damaging bird strikes reported to COMNAVSAFECEN, 375 A St, Norfolk, VA 2311-4393?

9. Are all available bird remains (feathers, beaks, feet) regularly collected for a bird strike?

10. Are bird remains picked up by Natural Resources for identification?

11. Are periodic surveys taken of the airfield and surrounding area to observe potential and actual bird hazards?

12. Are reports of observations and dispersal efforts maintained by the BDDT in order to establish records?

13. During periodic surveys, are areas like standing water and food sources noted?

14. Does the mowing or guideline contract specify that the grass be maintained at a height of 6-12 inches?

15. Have aircraft hangars and buildings been inspected for pest birds?

16. Do bird droppings cause a problem for equipment or aircraft?

17. Is the cost of cleaning up the bird droppings and any damage incurred less than any type of

solution to the problem?

18. Does the control tower warn operations and pilots of birds in the airdrome?

19. Is the BDDT team aggressively harassing birds on the airfield?

20. Does the BHWG suggest ways of altering the situation or changing the habitat to discourage birds from the airfield as well as suggesting elimination or reduction techniques?